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Standards of Quality and Performance.

CONSIDERATION of the new I.E.E. Regulations for the electrical equipment of buildings again raises the question of the possibility of establishing a British Bureau of Standards, or Proving House, to which consultants, insurance offices, supply authorities, manufacturers, and users could refer for definite and authoritative information as to whether apparatus or accessories complied with the requirements of safety and efficiency.

It will be remembered that the late Mr. C. H. Wordingham devoted much time and energy to the subject; and a Committee was appointed by the Institution of Electrical Engineers to investigate the matter, but nothing has been heard of it in recent years. There can be little doubt that electrical manufacturing and installation engineers in the British Isles have been for a long time at a disadvantage as compared with engineers in the United States of America. In that country, electrical accessories and installation practice are all more or less rigidly controlled by the National Board of Fire Underwriters, who not only issue a Code of requirements, but also possess an elaborately equipped laboratory and are prepared to test and certify whether any piece of apparatus complies with the Code or not. The approval of the Board is accepted by practically all engineers and supply authorities as an implied guarantee that the goods are suitable for their purpose.*

It is not difficult for an American manufacturer, familiar with the requirements of the Code, to design and manufacture goods secure in the knowledge that once the testing fees are paid, approval is obtained, and the label affixed, his goods will be accepted from side to side and from end to end of the North American Continent. This means that standard articles can be produced without variation, and every advantage can be taken of the economies of large-scale production, with the consequent reduction of costs and prices.

In the British Isles we have no such supreme authority. Each manufacturer, anxious to please some section of the industry, works out his own problems, makes arrangements for his own tests, and evolves patterns which he feels and hopes will please his own limited range of customers, with the certain knowledge, gained by painful experience, that however perfect the product, there will be a considerable number of supply

* A full account of the organisation of the Underwriters' Laboratories (Inc.) was given in a report by Mr. C. Hamilton Wickes to the Board of Trade. See ELEC. REV., January 3rd, 1913.

authorities and consulting engineers who will require modifications made, entirely outside such regulations as exist, before it meets with their approval. On these lines it is clearly difficult to standardise designs or to take advantage of the economies of large-scale production.

It may be urged that the British freedom of practice has been fruitful of progress in design; possibly it has, but obviously a very large number of variations and quite unnecessary patterns are produced, all of which must in the long run be paid for by the industry, and the lack of an authority on standards of quality has certainly permitted the use of a very large amount of foreign and other accessories of a quality very much below that which would be accepted and marked by any responsible testing authority.

The National Board of Fire Underwriters is financed by the insurance companies, and maintains an elaborately equipped laboratory, which is run on business lines, the testing fees from manufacturers and the sales of the labels defraying most, if not all, of the expenses, in much the same way as in England the fees for the hall-marking of gold and silver wrought plate cover the expenses of the various Assay Offices. It is to be noted that the slogan of the underwriters' laboratories is: "For Service—Not Profit."

As the American National Board has the active support of all the insurance offices, its powers are extensive and peculiar. The labels issued by the Board for affixing to approved apparatus act as a guarantee to the user, and even more important, to the manufacturer, that the goods so marked comply with the code and will be accepted for use upon any installation in the United States of America or in Canada. This is real "service," and as such is, one hopes, willingly paid for by the manufacturers, and eventually by the consumer.

Matters are so arranged that it is almost, if not quite, impossible for a British or other manufacturer to secure the services of the Bureau. It is a little difficult to explain how this exclusion works, but there are several British manufacturers who have had experiences in this direction: some amusing, some painful, but all expensive and futile.

It will be seen, therefore, that the working of the Code and of the Testing Bureau closes not only the whole of the United States, but also the British Dominion of Canada, to British electrical apparatus and accessories —much more so than is possible under mere protective tariffs, however high they may be.

By this somewhat devious course, we come back to the new I.E.E. Rules. It is to be noted that a very large number of supply authorities and insurance companies have "adopted" the Regulations, but one wonders precisely how they are to satisfy themselves that the materials used in installation work under their control comply with them.

For instance, it is apparently not yet realised that Regulation No. 67, Clause "B" (Rule 96, old Rules), if insisted upon by supply authorities and insurance companies, would make obsolete practically all the commercial ironclad switch and fuse gear that is in use, and is at present being manufactured.

One presumes that the Regulation means what it says: that a switch rated by the manufacturer at, say, 100 amperes, 600 volts, must be capable of breaking circuit without flashing to case on a load of 150 amperes, at a pressure of 900 volts, with the case earthed; if so, it is exceedingly doubtful whether much of the gear being sold as suitable for 500- or 600-volt circuits complies with this regulation. (According to the annual report of the I.M.E.A., a Sub-Committee of the B.E.S.A. has decided that the margin of 50 per cent. is much too high.)

In any case, it is one of the weaknesses of the British system that there is no authority empowered to insist upon and certify compliance with any such regulations.

There is evidence that many of the manufacturers of electrical apparatus are protectionist in politics; but it may be suggested that a Proving House, properly supported by supply authorities and insurance companies, would furnish a very much more effective protection of British manufactures against cheap foreign accessories than would any import duties within the realm of practical politics.

Surely it is not beyond the wit of the various interests to devise such a scheme. The embryo is in the new I.E.E. Rules, and there is an actual example successfully working on the other side of the Atlantic. Will anyone who has had experience of the internal working of the American Underwriters' Laboratories please tell us something about them?

Invisible Atmospheric Pollution.

A NEW light is thrown upon the origin of many obscure forms of physical and mental disease and indisposition, which have become increasingly prevalent of recent years, in a highly suggestive monograph by Dr. W. Vernon Sinclair, entitled "Combustion and Atmosphere and their Relation to Disease."*

We are reminded in the foreword that the heating apparatus of greenhouses and hot-houses is always so arranged that no products of combustion can enter the houses, because "every gardener knows that plants wither and die if they are given air to breathe which is impregnated with gas and coke combustion products."

Stress is laid—and we think rightly—upon the incompleteness of the Smoke Abatement Committee's recommendations which, the author points out, "appear to be founded, not on the effects of combustion vapours which are virulently poisonous, but upon visible smoke which may be almost entirely composed of carbon, and therefore non-poisonous, though mechanically annoying and disturbing."

Among the invisible sources of atmospheric pollution, carbon monoxide is, in Dr. Sinclair's opinion, the most deadly. Like carbonic acid, it is tasteless, colourless, and odourless, but whereas carbonic acid acts chiefly by displacing oxygen, and does not form a chemical combination with any constituent of the blood, carbon monoxide is a true and active poison, not only displacing oxygen but entering into chemical combination with the haemoglobin of the blood, so that in continued inhalation, a store of organic poison remains in the *tissues*, and although the *blood* may be re-oxygenated by pure fresh air, muscular exertion will cause the blood to re-absorb carbon monoxide from the tissues, thus bringing about a return of the original symptoms. Hence a long-continued process of interchange between fresh air, blood, tissues, and tissue-cells is unavoidable for complete rehabilitation after breathing, for any length of time, air containing even a weak mixture of carbon monoxide.

In slow-combustion stoves, access of air is purposely restricted, thereby promoting the formation of carbon monoxide which, as Dr. Sinclair rightly points out, passes through hot cast iron with remarkable facility. He considers that the great extension of heating and cooking by gas and warming by slow-combustion stoves is responsible for the vitiation of the air of dwelling places to a degree which has become a menace to national health. Lighting, heating, and cooking by gas are therefore condemned, as well as slow-combustion stoves, unless they are so arranged that the removal of all products of combustion from the house is assured. The almost universal neglect of this necessary precaution has not escaped the notice of the authorities. A report to the Board of Trade on Carbon Monoxide in Public Gas Supplies, made by Mr. W. J. A. Butterfield, one of the Gas Referees, was issued on July 31st, 1924. Mr. Butterfield recommends the elimination from the trade of all types of fittings liable to become unsound after a few years' use, and all flueless "heaters" or other appliances which are apt to evolve carbon monoxide. He also recommends that the Board of Trade shall take steps, if found necessary, to secure to local authorities powers to stop the sale and supply in their

* John Bale, Sons & Danielsson, Ltd. 2s. net.

districts of gas appliances which do not fulfil the requirements as to trustworthiness. The results of lengthy atmospheric tests carried out by Dr. Sinclair in a well-built London house confirm the wisdom of Mr. Butterfield's recommendations.

We are not surprised to find Dr. Sinclair a strong protagonist of electricity for all domestic purposes, because the absence of *any* products of combustion in electric lighting, heating, or cooking appliances precludes the possibility of imperceptible (and therefore all the more dangerous) gradual poisoning by gases which are not detected by the senses.

The monograph is addressed *ad populum*, and although touching at times upon technical matter, will throughout be readily "understanded of the people."

Dr. Sinclair deals with an aspect of hygienics which heretofore has certainly not received the attention it deserves. His work should serve to awaken us to the risks to which we are exposed by the heating and lighting methods referred to, and to emphasise the importance of wider legislative powers to abate, not only *visible* smoke, but also the wholesale discharge into the atmosphere of manufacturing towns and cities, of quantities of *invisible* poison gases.

A Memorial to Michael Faraday.

WE learn with some surprise, from a paragraph in the *Evening Standard*, that no public memorial to Michael Faraday has yet been erected in this country. This statement has been made on the authority of his cousin, the Rev. J. W. Faraday, who knew him personally.

The great apostle of research, who laid the solid foundations upon which the whole superstructure of electrical engineering has been built, made no attempt to exploit commercially his epoch-making discoveries and inventions; for him it was sufficient reward to know that he had explored and opened up new fields, and he presented his priceless treasures to the world in return for a bare subsistence. Of necessity he lived and died in a period when the ultimate value of his gifts could not even be surmised, for there was no electrical industry to do honour to his name. It may be said of him, as of Sir Christopher Wren, that those who seek his monument need only look around; but are we to be content with such a recognition of the life-work of our greatest physicist? It is true that in every country of the world his work is to be seen—but it is not associated with his name.

We cannot believe that the great electrical industry of this country, Faraday's native land, which to-day is prosperous when other industries languish, will suffer the reproach to lie upon it that it failed to place on record in appropriate form its appreciation of his high merits, to which it owes its existence. Nor will the sister industry—that of manufacturing chemistry—which has recently celebrated the centenary of Faraday's discovery of benzene, be backward in remedying this omission. A committee should be set up to raise funds for the purpose of creating a memorial worthy of so great a subject, and we trust that the Council of the Institution of Electrical Engineers, which has already associated his name and portrait with its most honourable award for scientific merit, will hasten to be the first to take action.

Electricity Supply in Paris.

A RECORD of further progress is contained in the annual report of the Compagnie Parisienne de Distribution d'Electricité, which has a monopoly of the supply business in the French capital. The number of consumers, which stood in round figures at 379,000 at the close of 1923, increased during 1924 to 442,000, and the consumption of energy advanced from 300,948,000 kWh to 356,426,000 kWh. In 1924, 152 millions of this total represented the consumption of energy for power purposes, or an increase of 15 per cent. over 1923, while the consumption for lighting purposes rose by 21 per cent., from 168 millions to 204 millions. The maximum power supplied to the Paris network amounted to 225,000 kW, or 32,000 kW in excess of 1923, and in addition about 25,000 kW was purchased from other producing companies. A further development of the demand took place in the first quarter of 1925. The company has proceeded with the execution of the extension programmes approved by the City Council, sanction having been given since the end of 1918 to five programmes representing a total expenditure of 630,000,000 fr., of which 470,000,000 fr. had been expended down to the end of last year. A sixth scheme was presented to the City Council at the end of 1924, proposing an outlay of 156,000,000 fr. in order to bring the transforming and distributing plant on a level with the increased productive capacity of the generating stations. The share of the City in the net profits for 1924 amounts to 21,490,000 fr., while the surplus available to the company is 33,353,000 fr., permitting of the payment of a dividend at the gross rate of 60 fr. per share.

Electricity Supply—1920-1923.

IN our issue of Jan. 16th, 1925, we reviewed a Return compiled by the Electricity Commission, giving full particulars relating to authorised electricity supply undertakings in Great Britain, from the administrative side; we have now received from the Commissioners a companion volume, described as a "Return of Engineering and Financial Statistics" and covering the years 1920-1923. This volume of 628 pages contains a vast store of information and data, correct up to the end of March or middle of May, 1923, for local authorities, and to the end of 1922 for companies. The first questionnaire was issued in November, 1921. We understood that the Commissioners are considering the issue of a further Return as soon as possible, for the two years 1923-24 and 1924-25, and hope afterwards to issue a volume annually.

The present issue (which may be obtained from the Stationery Office, price 15s. plus postage) gives for all undertakings particulars of the system of supply, plant installed, max. demand and load factor, fuel consumption, output (analysed), and other data, for each of the three years covered; it also contains detailed statements of expenditure and revenue, working costs, surplus, and the mode of appropriation. These statistics occupy the bulk of the volume, the remainder being devoted to summary tables and generalised information regarding the technical and financial position of electricity supply undertakings, as well as classification tables, &c. Altogether it is a remarkable production, which will give food for cogitation and deduction in abundance, and whilst we have only been able at the moment to gauge its potentialities, we have no hesitation in congratulating its compilers on a monumental achievement, which reflects upon them the greatest credit.

It is interesting to contrast this huge effort with previous attempts on the part of the Government to compile statistical information regarding the electricity supply industry. The preface states: "A fact which impressed the Electricity Commissioners at the outset of their duties in 1920 was the lack of comprehensive official statistics covering the public supply of electricity in Great Britain as a whole"; no wonder—as far as we can ascertain, the only Returns previously issued were those prepared by the Board of Trade and published in 1901 and 1902, for the years 1899 and 1900. These were White Papers of 8 or 9 pages each, and were very incomplete; they dealt with only 126 local authorities and 63 companies, and cannot have been of much utility. But let us not be too critical of the work of an inadequate staff a long time ago; electricity supply was only a side line with the Board of Trade—it is the whole purpose of the Electricity Commissioners, whose Return will be dealt with more fully in a later issue.

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Low-Frequency Inter-Valve Transformers.

Considerations affecting their Design.

By J. STEVENS.

IT is a curious fact that when any firm of electrical engineers decides to manufacture radio instruments, the first component which seems to receive attention is the l.f. intervalve transformer. Why this should be is hard to understand, since the correct design of such transformers is a very difficult matter requiring extremely careful study and consideration.

In common with power transformers, more widely known and understood in electrical circles, the intervalve transformer consists mainly of three parts: (*a*) iron core, (*b*) primary winding, and (*c*) secondary winding. If a satisfactory instrument is to be the result of our design, it is necessary to study these three main parts both separately and in combination. The design of the iron core is very dependent on the primary winding, so that it would be as well for us to study this winding first of all.

When telephony is being received, the primary of the intervalve transformer receives a current oscillating at frequencies varying from 200 to 3,000 cycles per second, rapid changes in the frequency taking place as the signal, which may be either speech or music, continues. In order to maintain the articulation in its original pure form the primary circuit must be quite free from any conditions which will tend to vary the frequencies or prevent their rapid change. Another desirable feature, from an efficiency standpoint, is that the impedance of the primary winding shall be as low as possible, although when the transformer receives its primary current from a thermionic valve, it is essential that this impedance shall not be less than the anode impedance of the valve to which it is coupled. The capacity of the winding should also be as low as possible in order to avoid resonance or "booming" effects at certain frequencies, while the high-frequency resistance and current-carrying capacity of the wire have also to be given consideration. In order to further avoid resonance effects, the inductance of the primary winding should be as high as possible. This, of course, will bring the natural frequency outside the limits of audibility.

To abbreviate these points, we can say that the desirable features of an intervalve transformer primary winding are:

(*a*) Low impedance, which, however, should not be lower than the anode impedance of the valve.
(*b*) Low self capacity, to avoid resonance effects.
(*c*) High inductance, to bring natural wavelength outside audible limits.
(*d*) Low high-frequency resistance and ample current-carrying capacity of wire.

Thus it will be seen that (*a*) is in itself a sort of compromise, while (*a*) and (*c*) are directly opposed to one another, and our problem seems very intricate even at this stage.

Now, as the winding possesses both capacity and inductance, we can look upon it as an oscillatory circuit, the natural frequency of which can be determined from the formula—

$$n = 5.033 \times 10^5 / \sqrt{CL}.$$

where n = oscillation frequency of circuit in cycles per second,
C = capacity in microfarads,
L = inductance in centimetres.

From this it will be seen that in order to bring the natural frequency outside the limits of audibility, the product LC must be made very small, thus making the natural frequency high.

If the primary of a transformer has a low impedance it follows that it must have a low inductance, and as, therefore, the winding will be small, it will possess a low capacity also, and this appears to meet the condition of having a natural frequency outside audible limits. In practice, however, we are confronted by another trouble in the shape of "howling" or the persistence of high-frequqency oscillation. This can be overcome by bringing the natural frequency of the primary much closer to the audible limit, and to do this we must either increase the inductance or the capacity. It will be realised from the opening remarks that both methods are detrimental, the former from the point of view of impedance, and the latter from that of resonance. The best solution apparently would be to provide an independent condenser across the winding and to keep the inductance as low as possible. With this arrangement the natural impedance and capacity of the coil are kept low, while the natural frequency of the winding combined with the condenser is brought closer to the audible frequency and "howling" eliminated. The shunting condenser will, in addition, tend to improve the power factor and consequently the efficiency.

With regard to the size of the wire to be used in winding the primary, a suitable size can be chosen from tabulated data to suit the range of frequencies. Generally speaking, however, No. 36 S.W.G. seems to best meet the conditions obtaining in the primary winding of an intervalve transformer.

Our next consideration is the iron core and, with the exception that the effects are magnetic, the conditions are the same as in the primary winding. The core receives high-frequency magnetic impulses whose strength is dependent on the ampere turns in the primary winding. For pure transformation it is essential that these impulses shall be in absolute synchronism and have a wave form identical with the current oscillations producing them. Should any form of natural or superposed non-synchronous magnetic impulses be present, or reluctance in the iron to rapid changes of flux, distortion of the wave form will result.

The ideal iron core would have a straight line magnetising and de-magnetising characteristic curve, but, of course, this is a practical impossibility. The degree of magnetism of the iron is also an important factor, as if too little, or too much, ripples will be set up in the wave form.

In the case of an iron core working on the flat portion at the upper end of the magnetising curve, the resultant wave will be flat-topped, and a strong harmonic of three times the fundamental frequency will be produced. This will be impressed upon the fundamental from which it will differ in phase by 180 deg., and will not only distort the wave form, but will also affect the hysteresis of the core in so far that it will now have to handle a secondary flux three times the frequency of the fundamental flux and 180 deg. out of phase with it. This will tend to neutralise the fundamental and produce "woolliness" of articulation. Similar conditions, although less marked, will be obtained if the iron is worked at the flat portion at the bottom of the magnetising curve.

The magnetic inductance of the iron used for the core should be about 3,000 lines per sq. cm., *i.e.*, on the steepest portion of the magnetising curve, at which point very rapid changes in the frequency of the magnetic impulses can be obtained with the minimum of distortion.

An excellent core can be made up from "Stalloy" stampings of "T" and "U" shape, assembled alternately so that no gaps occur due to the overlapping of the pieces. Each lamination should be insulated from its neighbours by paper and arranged so that the "U" section is completely insulated from the

"T" section. It is of the utmost importance when using shell-type laminations that there shall not be a complete circuit of iron round the coil. No rivets should be used to clamp the core, but the laminations should be held together by two clamps, also insulated from the stampings, and so arranged that they do not cross the line of any stray fields, which would set up eddy currents in them.

We must now turn our attention to the secondary winding, but before dealing with this part in detail, a note on the question of the ratio of transformation would not be out of place. Theoretically, the ratio of the turns of an intervalve transformer should equal the square root of the ratio of the secondary load to primary outside impedance. This, however, does not work out in practice, as many difficulties present themselves. Thus, we can only determine the ratio by approximate formulæ which have been founded on practical experience. A good formula for the purpose is—

$$T.R. = 250{,}000/V.P.$$

where T.R. = turns ratio,
V.P. = anode impedance of valve to be connected to primary.

The secondary winding of the transformer should in no way unbalance or distort the effects in the primary or iron core. It has a larger number of turns than the primary, as a "step-up" effect in voltage is required, so that we have now to deal with a winding having an inductance many times greater than that of the primary, and whose capacity, owing to the mean diameter of the turns being greater, is comparatively large also. It follows, therefore, that the natural wavelength is large and the frequency low, as nearly as possible within the range of audibility. It is essential that the capacity be reduced, as the natural frequency of the coil must be brought outside the limits of audibility. No reduction of inductance can be made to obtain this end.

Unless the natural frequency of the coil is brought outside the audible limits, considerable booming will take place on any signal having a frequency the same as that of the coil. The capacity of such a winding may be decreased by increasing the number of layers of wire in the coil by winding in sections, or by increasing the distance between the layers, or by using some form of insulation having a low specific inductive capacity between the layers.

From a mechanical point of view, the wires in the secondary windings should be held in spaced relation to each other by some non-resonating material, and this remark also applies to the two main windings themselves.

These few notes will show the technical difficulties which are encountered in intervalve transformer design and, it is hoped, will help engineers desirous of turning their energies in this direction.

A Neglected Instrument of Precision.

The Necessity of a Close Study of Language.

By T. J. MONAGHAN, B.Sc. (Eng.) Hons., M.I.E.E.

Engineering is neither a science nor an art, but a combination of the two; it consists of collecting and classifying facts about those unvarying successions we call the laws of nature, and applying the knowledge so obtained to practical problems. The engineer finds out how things can be done, then does them as they should be done.

Science is based upon experiment, and fundamentally experiment is measurement; the engineer's aim is to carry principles into practice efficiently, and efficiency is rooted in measurement. The two-fold demand for means of measurement, in investigation and in execution, is liberally catered for to-day; the range of choice of instruments for almost every useful measurement is wide; we have available delicate, sensitive apparatus for the laboratory, robust, almost foolproof appliances for industrial use. The modern engineer prides himself on appreciating to the full the importance of accurate measurements, yet too often he neglects the most vital measurement of all, for who among us "always measures the length and breadth of his assertions"?

Now every assertion has two aspects, the thoughts upon which it is founded, and the way in which these thoughts are expressed. No engineer will admit for a moment that he is not a clear thinker, yet it cannot be denied that some engineers neglect to acquire the art of writing a clear, well-balanced statement. The mental attitude of such a delinquent appears to be: "I have done the work and have no time to waste in pretty writing about it. I would rather not write anything, but if I must write, then I will spend only so much time on it as is absolutely essential for putting the results on paper. Then I will get on with my real work." This attitude is quite a wrong one. In the interests of efficiency it is the duty of the engineer to communicate to his fellows any special knowledge he has acquired, for an engineering problem is not completely solved until the solution is available for the world at large; much useful knowledge fails to be circulated because its possessors decline to grapple with the pen. Again, an engineer is often called upon to give the benefit of his technical knowledge to non-technical people; he should, of course, give them the full benefit of his knowledge, and the extent to which he does so depends very largely upon the way in which his report marshalls the facts, draws up the arguments, and states his conclusions. Ability to express one's views and ideas effectively, and to drive home one's arguments convincingly, is, then, so important that a plea may well be urged for the closer study by the engineer of that most flexible and potent instrument for the measurement of assertions—the English language.

A close study of language is essential to all whose work calls for precision of statement. Language is a most important, if, indeed, not an indispensable, instrument of thought; who does not know that uncomfortable condition when ideas he cannot put into words float elusively in the mind, and the feeling of grasp and possession acquired when the ideas are captured by finding for them appropriate words? Language is the sole vehicle for the communication of all but the simplest ideas; through it we are indeed heirs to all the ages; by it we may attain some small share of immortality, if, perchance, records of our work lessen the labours of those who shall take up after us the search for engineering truths.

Language is used to convey our thoughts, and for our present purpose may be defined as combinations of words; we must consider, then, first words, and afterwards their combinations.

Words in many respects resemble money. Money is a medium of exchange; its value as money is exactly what we agree it shall have, and if the parties to a transaction involving a transfer of money have different ideas as to its worth, then before they can do business they must agree upon a rate of exchange. Now words are the currency of ideas, and there is often a rate of exchange between users of words, though unfortunately this may not be appreciated by the parties to the transaction. To the user a word means what *he* intends it to mean, to the hearer the word means what *he* thinks it means, and unless user and hearer attach the same significance to the word, confusion arises. The careful

writer will, therefore, endeavour to ensure that the words he uses to carry his ideas shall convey them without modification, by using ordinary words in their generally accepted senses, and where, as often happens, quite ordinary words have several meanings, he will make clear which of them he has in mind. Cultivate the habit of looking up in a good dictionary all words of whose meaning you are at all doubtful, and soon you will be referring to it for words the meanings of which you once were sure you knew perfectly. Technical terms are intended to express quite definite ideas, but with the rapid growth of scientific knowledge technical language is falling into arrears, and, as a result, some technical terms have more than one meaning, so that almost as much care is needed here as with ordinary language, to see that your words carry your exact meanings. You can take a horse to water but you cannot make him drink, but if you don't take him to the water he won't have a chance of drinking; so that while you cannot ensure that your readers will grasp your meaning, you can at least ensure that the responsibility for failure to do so does not rest on you.

Alive to the importance of selecting his words carefully, the writer now enters upon the task of forming them into proper combinations. We are not concerned here with correctness of grammatical structure, of which a reasonable standard is relatively easy to attain, but with combinations of words in a wider sense. What is the real aim of all professional writing? Surely it is to carry conviction, to bring others round to our point of view, to persuade them to adopt the course we advocate; in short, to carry our point!

If we are to have any opportunity of doing this, what we write must be read, and being read must be understood. To ensure that it shall be read we must make it interesting; to ensure that it shall be understood we must make it clear. But while different people may be interested in the same thing, they are not all interested in the same aspects of it. The technician is interested in why a thing happens, how a result may be attained, how a difficulty may be overcome; the business man is interested in when a thing can be done, how much it will cost and how much it will save; so that it is necessary first to ascertain the view point of the particular audience we wish to convince. Having decided the general method of treatment which will be best for our special appeal, the next point to decide is the method of approach. If the information we have to convey is such as the audience is prepared to believe if clearly laid before it, then an orderly straightforward method of explanation is best. But it often happens that our findings are likely to be unwelcome to the audience, and considerable care is necessary in such cases. The obnoxious statements should not be made until arguments have been adduced that will convince the audience that the statements must be accepted. When dealing with sceptical audiences there is a natural temptation to let oneself go in demolishing the opposition, but it is wiser merely to show that we are prepared to meet all objections to our arguments; our object is not to compel our audience to admit that its former views were wrong, but to persuade it to admit that our view is correct.

Facility in writing is not to be attained without diligent practice and the cultivation of a spirt of severe self-criticism. No matter how skilful one may be, it is useful in all important cases, if time permits, to put the completed report aside for a while, and to come back to it when the enthusiasm of composition has evaporated. If you do not find much that you will wish to amend, many obscurities where you thought all was crystal clear, you are indeed gifted.

And always remember that what your readers do not understand is useless. There are varieties in methods of expression. There is that of which no man can grasp the author's meaning, that from which an intelligent and persevering reader can unravel some shreds of the author's meaning and that the proud author of which can boldly "deny the ingenuity of man to give to our words any other meaning than that which we ourselves intend them to express." Strive diligently after this last!

Indian Electrical Trade.

(From our Indian Correspondent.)

For the last two or three years Indian electrical trade has shown a steady decline. During the first quarter of 1925, however, a slight tendency towards improvement was recorded. The imports of electrical machinery during January, February, and March amounted to 62½ lacs, as against 60 lacs during the corresponding period of the preceding year. In the case of electrical instruments and apparatus, an increase has also been recorded, the imports amounting to 62 lacs, as against 58 lacs in the first quarter of 1924, an increase of 7 per cent. In electrical machinery, a large increase of 11 lacs was recorded under miscellaneous kinds, while all other heads considerably declined, leaving a balance on the total of 2½ lacs of increase. Control and switchgear declined from 12½ to 11 lacs, generators and dynamos from 8 to 7 lacs, and meters from 14½ to 11½ lacs. The share of the United Kingdom in the total was 54½ lacs, as against 48½ lacs, an increase of 6 lacs. The United States also increased her share from 5 to 5½ lacs, but Germany's share, which is already small, declined from 1½ lacs to 1 lac.

In the trade in electrical instruments the share of the United Kingdom increased from 44 lacs to 46 lacs, not an insignificant improvement considering that during 1924 the imports from the United Kingdom considerably decreased. The share of the United States remained almost stationary at about 4½ lacs, but the share of Germany actually increased from 4 to 6 lacs. The imports of fans remained unchanged at about 9 lacs, but wire and cables increased from 21 to 28 lacs. The share of the United Kingdom in the latter case increased from 20 to 23 lacs, and in fans from 4 lacs to a little over 4½ lacs.

Socialism and Electricity.—Alderman Herbert Morrison, L.C.C., spoke on the subject of "Socialism and Electricity" at a meeting held recently under the auspices of the Hackney Independent Labour Party. In the course of his speech the alderman said that it was a vital and urgent question both in the Parliamentary and municipal fields whether British electricity supply and distribution was to be a public service run for the public good, or whether it was to be a private monopoly run for the purpose of securing profits to individuals, rather than securing prosperity to the people as a whole. The greater part of London was going to be handed over to a private electrical trust until 1971, but he hoped that before that time came there would be a Socialist Government in office again, with a Socialist Parliament behind it, and that they would undo the contract now being made by the present Government and the L.C.C., with private interests. In Greater London, the municipal supply had proved itself to be more enterprising and more economical than private ownership. They were still in the habit of saying that electricity was in its infancy. It had got beyond its infancy: it was being used for an increasing variety of purposes—not as an experiment, but as a practical part of everyday industrial life, and increasingly in domestic life.

Concrete Hardening and Waterproofing Compound.—We have received some interesting particulars concerning "Cemenfortis," a product of the Harvie Corporation, Ltd. It is a liquid chemical compound used for the hardening and waterproofing of concrete by virtue of its property of effecting complete combination of the concrete constituents. It is added to the gauging water, and carried through the mass of mixed concrete regardless of a variation in the size of the component materials. It combines chemically with the free lime of the cement, and with the particles of silica in the aggregate, forming hydrated calcic-silicate; and the voids in ordinary cement are filled with this cement solution. At the same time it is said to crystallise, forming a hard insoluble mass. The chemical combination brought about renders the concrete extremely hard and impervious to water under pressure. After adding "Cemenfortis" to cement, mortar and concrete, they become "fatty" compounds, giving a firm and yet cohesive workable mass ideal for trowelling. Another useful property of this compound is that it prevents concrete from freezing at the ordinary freezing temperature and it is claimed that it will permit of perfect hydration at 13 deg. F. This useful substance has been applied to many uses, including the construction of concrete water tanks and the treatment of damp walls.

The International E.H.P. Conference.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

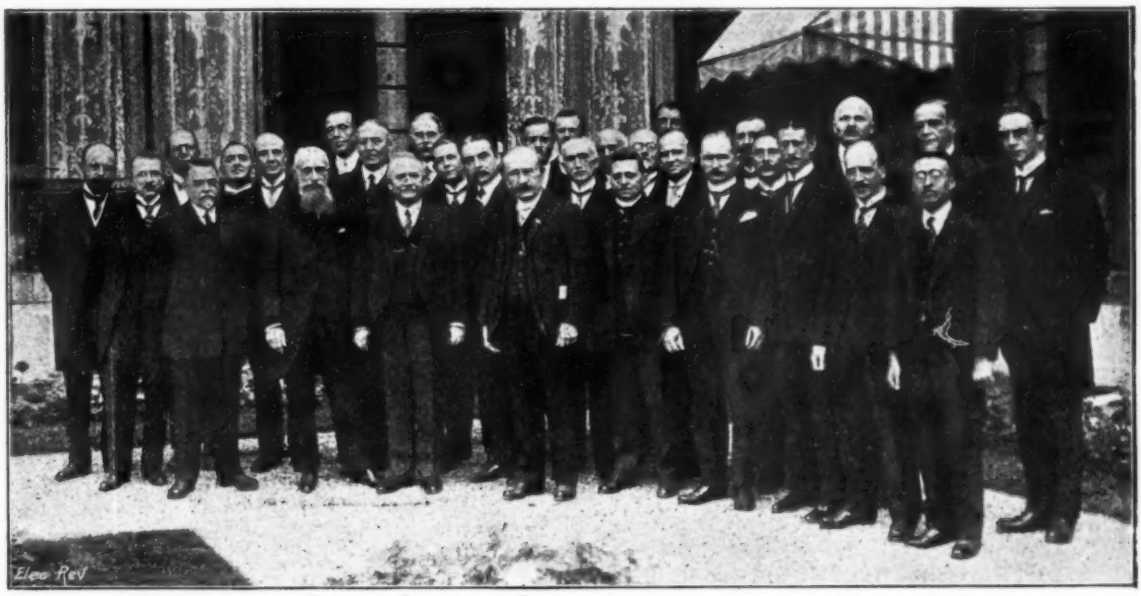
(*Continued from page* 1009. Vol. XCVI.)

The Papers.

This biennial conference is taken very seriously, and a large number of papers are dealt with. Together with reports—they numbered over 112—a marked increase on the 89 originally anticipated. They were discussed in three main groups: (I) The production and transformation of energy; (II) The construction and insulation of transmission lines; (III) The development of the transmission.

A conference such as this affords an opportunity for reviewing the general situation at the present day and also for estimating future progress. It is here proposed to consider the more important points raised in the papers, in the order given above.

Group (I) was subdivided as follows:—Boilers; construction of alternators; interconnection of power stations; operation in parallel; oils for transformers and switches; testing of generators and transformers; substations.



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1, The President, M. Doumergue; 2, M. Legouez (President of the Conference); 3, Dr. C. O. Mailloux (President of Honour of the Conference).

On the left in the second row are the British delegates, Messrs. S. C. Bartholomew, H. E. Midgley, A. Page, P. V. Hunter, W. B. Woodhouse (Vice-president), and R. B. Matthews.

Reception of the Principal Delegates by the President of the French Republic.

Boiler-house Matters.—As the president of the first section remarked in the summarised report of its work, boiler-house matters would seem a little outside the scope of the section; however, the papers presented by Mr. E. Lafon and Dr. W. Lulofs were of some importance in this connection. A plea was made for the chimney as against the blower, it being claimed that present-day design could increase the efficiency by as much as 50 per cent. Dr. Lulofs gave the results of his experience with powdered fuel. He prefers the unit system (one boiler, one powdering plant) as compared with the American practice of a central system. One advantage is that the mills can take hot air from between the double walls of the combustion chamber; altogether it is claimed that as efficient results can be obtained from the unit system as from the central system, while the former has many more advantages.

The construction of alternators was examined in three papers, which gave the latest phases of technical construction (Messrs. E. Roth, M. Langlois, and E. Wilczek). Mr. Roth pointed out the necessity, in the case of turbo-alternators feeding lines having a large capacity, for designing the armature reaction to be sufficiently weak to assure stability of running under all conditions of operation and to avoid self-excitation. In order to retain the instantaneous value of the short-circuit current within permissible limits, the armature leakage must be artificially increased, *e.g.*, by leakage slots. Langlois described in detail the design of a 15,000-kW alternator for operation at either 25 or 50 cycles in a Paris station, which supplies at both frequencies. This was accomplished by connecting the machine so that it could either be used as a 4-pole or a 2-pole unit. However, the problem did not end at this point, and the author gave further particulars of the solution. Dr. Wilczek gave some results obtained by the firm of Ganz, of Budapest, in the construction of high-speed alternators (3,000 r.p.m.), wherein an attempt had been made to greatly improve the characteristics of true sinusoidal wave-form, overload, single-phase short-circuit, &c.

Interconnection of Networks and Parallel Working.—Sartori drew attention to the work of Prof. Donati, of Bologna University, in applying the principle of reciprocity to the calculation and operation of large networks. This work should do much to facilitate the mathematical analysis of the current distribution in the large distribution systems that have come into being of late years.

The problem of the exchange of energy between linked stations was dealt with in several papers, which caused considerable discussion. Unfortunately the problem seems to be as yet a long way from complete solution. The principal points brought forward were: The calculations of the networks; the phenomena of auto-excitation; and selective protection against short-circuits. In connection with the question as to the employment of inductances, the opinion seemed to prevail that they should be eliminated and replaced by fuses, for the latter assure a security at least as great and are much cheaper. However, it appeared that the use of inductances between machines should be retained. Another interesting statement was that it was now feasible to connect networks of different frequencies. This possibility is, of course, of great interest to those countries where the frequency is not as yet standardised.

(*To be continued.*)

The World Power Conference of 1924.

A Review of the "Transactions."

SUFFICIENT time has probably not yet elapsed for a general appreciation to be formed of the far-reaching importance of the first World Power Conference, which was held in connection with the British Empire Exhibition at Wembley in June and July, 1924. There can be no question, however, that apart from their great number, the exhaustive character of the papers submitted to the Conference cannot fail to have an important bearing upon future electrical progress. It is therefore a matter of the highest importance that the work of the Conference has been collated for the benefit of future generations in the form of four volumes, some idea of the extent of which may be gathered from the fact that, apart from a large number of double sheets of illustrations and tabular statements, they comprise no fewer than 6,423 pages, and that not only is the full text of the various papers given, but also a verbatim report of the ensuing discussions.*

From this it will be appreciated that the task of reviewing the "Transactions," as they are officially styled, is by no means an easy one, and, in view of the limitations of space, it will be impossible for us to do more than briefly summarise the various volumes, drawing attention to some features of each that appear to be of particular importance.

The World's Resources.

Volume I, which is devoted to the subject of "The Power Resources of the World—Available and Utilised," opens with a preface by the Organising Director of the Conference, Mr. D. N. Dunlop, in which he pays a tribute to the Council of the British Electrical and Allied Manufacturers' Association—which by ensuring the necessary financial support made the far from easy task of organising a World Conference possible—and to the distinguished scientists, engineers, and leaders in all parts of the globe who, by their efforts, both directly and indirectly, assisted in its unquestionable success. From the Preface we may perhaps jump to a reference to the Appendix, which gives full particulars of the opening ceremony by the Prince of Wales, the speeches at the inaugural banquet, the names of the members of all the Organising Councils and Committees, and a complete list of the delegates to, and members of, the Conference. This indicates that, apart from Great Britain, delegates were present from no fewer than a dozen different parts of the British Empire, and from twenty-nine foreign countries—literally from "China to Peru." Thus, in view of the exhaustive character of the work—and here a tribute may be paid to those who have been responsible for the editing of the "Transactions," necessitating as it did a technical knowledge of many languages, as well as to the printers and publishers—it would be ungracious to criticise, even if such were necessary.

Turning now to the papers included in Vol. I, these, as already indicated, all relate to the Power Resources of the World. There is hardly a country or State that is not dealt with, and while a good deal of space is devoted to hydro-electrical resources, the equally important ones, for many countries, of coal, lignite, peat, mineral oil, and power alcohol, are all treated in a manner, the exhaustive character of which has never previously been attained. Although it is almost invidious to particularise, we regard the information given in the papers referring to the power resources of Australia, India, Russia, Esthonia, and several others as yet not fully-developed countries as extremely valuable as affording much information that may prove useful to British electrical engineering and financing undertakings in the quest for new opportunities of enterprise. In the case of Esthonia, in a written contribution to the discussion, Mr. Alfred Dickinson, of Birmingham, considers that that country possesses some of the most important possibilities for water-power development in Europe, and, after an inspection of the site, he expresses the opinion that the scheme for the establishment of hydro-electric plant at Narwa, capable of yielding a continuous minimum of 60,000 h.p., is sound from both the engineering and the commercial aspects.

The Production of Energy.

The second volume is allotted to the papers submitted under the comprehensive headings of "Water Power Production," "Preparation of Fuels," and "Steam Power Production," the subjects being dealt with from all aspects—physical, technical, and financial. In the first category there are no fewer than about 42 papers, grouped into sub-divisions of General, Civil, and Mechanical Engineering and Operation. Every aspect of the subject is dealt with by the experts of all the principal countries of the world, thus affording in a compact form information as to the latest practice in hydro-electrotechnics that cannot fail to be of material value to all interested in this class of work. Special attention may be drawn to the exhaustive papers by Dr. H. J. Acres, the chief hydraulic engineer of the Hydro-Electric Power Commission of Ontario, on "The Generation of Hydro-Electric Power in Canada," that of Mr. A. Westerlind, the director of the Swedish Bureau of Hydraulic Construction, on "Recent Practice in Swedish Water Power Engineering," and that of Ing. L. Mangiagalli on "Dam Construction in Italy."

In a written contribution to the discussion on Water Power Production, Col. B. C. Battye, superintending engineer of the Punjab Hydro-Electric Circle, points out that it has been the custom for many years in India to use the expression "cusec" for cubic-feet-per-second as the unit of flow, and suggests that this should be made an international unit—at least among those nations using foot-pound-second units—and also that the unit of storage for power purposes be standardised in the future as a "cusec-day." In numerous reports submitted to the Conference, all sorts of different storage units were quoted, from gallons to cubic feet, acre-feet, cubic metres, &c., and in this connection we may venture the suggestion that prior to the next Conference a schedule of all these, and their equivalents in both metric and English measures, might be prepared for circulation among the various National Committees, so that in the preparation of the papers a uniform basis of dimensions and quantities might be adhered to.

The second section of Vol. II deals with "The Preparation and Utilisation of Fuels," this being divided into a trio of sub-sections—"Fuels Generally and Coal," "Preparation of Fuels," and "Utilisation of Fuels." In the first category coal takes a leading position, and in view of its importance from the British industrial point of view it is not unnatural to find a larger proportion of papers by British experts than is the case in the hydro-electric division. The subject is dealt with in the usual exhaustive manner, it being made clear that everything is being done to conserve the known coal resources of the world by utilising them in the most efficient manner. In the section dealing with the Preparation of Fuels, in addition to coal, attention is devoted to peat, shale oil, and the utilisation of wood waste, the latter having assumed considerable importance in such countries as Sweden. In the Fuel Utilisation section, the principal subjects dealt with are those of the use of coke and pulverised coal for the firing of steam boilers.

The concluding portion of this volume is allotted to

*The *Transactions* of the First World Power Conference. Four volumes. London: Percy Lund, Humphries & Co., Ltd. Price £12, or £3 10s. per volume. (Index Vol. £2 net.)

the papers on the subject of Steam Generation and Utilisation. It is with regret that we can do no more than point out that they deal with the latest steam boiler, turbine, and engine practice in all parts of the world, the information making it clear that much useful work is being done in the direction of utilising steam at very much higher pressures than has hitherto been the rule.

Internal-combustion Engines and Power Transmission.

Various branches of the Conference's work are embraced in Volume III. The first is that of "Internal Combustion Engines," in which the progress of Diesel-engine design and construction, particularly in Italy, Sweden, and Germany, is dealt with at great length. One paper also deals with large gas engines—a branch of power engineering to which great attention is being devoted in Germany, whose experts claim that they are able to turn out gas-operated engines for central-station work that show a financial economy over steam turbines. In a subsequent section are four papers dealing with various aspects of gas for power and illuminating purposes, while under the omnibus heading of "Power from Other Sources" are several papers relating to the use of wind motors, especially in Denmark and Holland, to alcohol as a source of power, and to the existence and use of natural steam in Italy.

The interest of electrical engineers in this volume will, however, be mainly centred on the three subdivisions of "Power Transmission and Distribution," "Power Station and Transmission Lines," and "Cables and High-voltage Direct-current Systems." There are close upon fifty papers on these subjects, in the course of which modern practice in all the principal countries of the world is set out in full detail. Special attention may be drawn to the great electrical development which is apparently taking place in Soviet Russia, despite the fact that international trading relations with that country have not, since the war and the subsequent political upheaval, been re-established; to the papers on the parallel working of generating stations in Holland and Italy, and to high-voltage transmission progress in France, Italy, and the United States.

M. G. Darrieus, the engineer to the Compagnie Electro-Mecanique, of Paris, in a written contribution to the discussion on the paper by Messrs. J. S. and W. E. Highfield on "High-Voltage Direct-Current Generation and Distribution of Electrical Energy," which appears in this section, and which includes a description of the "transverter" jointly invented by Messrs. J. E. Calverley and W. E. Highfield, points out that the system of conversion adopted in the transverter was invented more than twenty-five years ago, and that a number of machines have been built on this principle, some of them having been working quite recently on the French Northern Railway and in certain of the Paris districts. M. Darrieus, however, adds that this does not detract from the great credit due to Messrs. Calverley and Highfield for overcoming considerable difficulties, and accomplishing the improvement of the crude apparatus of 1898 into the powerful high-pressure machine we all admire to-day.

The remaining portion of Volume III is devoted to "Research," "Standardisation," and "Illumination." Although in the first of these divisions only four papers were presented, dealing mainly with what is being done in Austria and Sweden, they gave rise to one of the longest and most interesting discussions. In the case of "Standardisation," accounts are given of the position in Austria, the Dutch East Indies, Germany, Norway, and Sweden, while two papers deal with the question of international standardisation. In the "Illumination" section the principal contribution was that of Mr. C. W. Sully, presented on behalf of the Electric Lamp Manufacturers' Association of Great Britain.

Power in Industry and Transport, Economics, &c.

The final volume of the "Transactions" (No. IV), as might be expected, is devoted to a wide range of subjects. First, there is a collection of no fewer than 29 papers on "Power in Industry," one of the most exhaustive of which is the series collated by Mr. P. T. Davies, A.M.I.E.E., the president of the Canadian Electrical Association; it deals most thoroughly with all the varied applications of electric power in the Dominion from the largest industry down to domestic requirements. Many of the papers, while dealing mainly with the use of electricity in agriculture and rural industries in Denmark, Germany, Holland, and Norway, and other countries, also refer to other industries, and are consequently included in this section. We mention this, as otherwise it might appear that, with only four papers, the "Power in Domestic Uses and Agriculture" section had been somewhat neglected. Two of the papers in this category—those by Dr. H. Wallem, of the Siemens-Schuckertwerke, Berlin, and Mr. R. Borlase Matthews, M.I.E.E., both of whom have made a special study of electro-farming—are especially worthy of mention. Half-a-dozen papers record the progress made in "Electro-Chemistry" in Austria, Scotland, Norway, Sweden, and the United States, while there are four devoted to "Electro-Metallurgy." That veteran, Col. R. E. Crompton, figures as the author of one of the five papers on "Power for Road and Air Transport," after which we come to the "Power for Rail Transport" section, in which, in view of the importance of the subject, it is not surprising to find no less than fourteen papers, notable contributions being those of Mr. Roger T. Smith on "Electric Railways in Great Britain," and Sir Philip Dawson on "The Financial Aspects of Main Line Electrification." Other authorities deal with the progress of electric railways in Austria, Java, Germany, Holland, Hungary, Italy, Norway, Sweden, and the United States; the only country which has made great strides in railway electrification work, but of which no detailed information was presented to the Conference, is Switzerland, the only reference thereto being in the "Water Utilisation" section.

Passing over the "Power for Water Transport" division of the volume, in which out of the fifteen papers presented only one—that read by Mr. W. J. Belsey, of the British Thomson-Houston Co., Ltd., on "Electric Transmission of Power for Propelling Machinery"—calls for mention, we come to the record of the work done in what we regard as one of the important sections of the Conference—"The Economic Aspect of Power Resources." The subject is treated from many angles and also from the point of view of various countries, thus providing much matter for careful study by all—even Royal Commissions and Government Committees—interested in the extension of electricity supply in the United Kingdom.

It was perhaps somewhat daring of a Belgian engineer—M. A. Heinemann, of Brussels—to present a paper on "Electricity in the Region of London," but it is always well "to see ourselves as others see us," and the author's remark that the cost of energy supply in the County of London in 1921 was more than double that of the average in the United States, should not pass unnoticed. Two other important papers in this section were that by Mr. George Balfour, M.P., M.I.E.E., on "Financial Considerations of Hydro-Electric Development, with special reference to Great Britain," and that by Major-General Sir Philip A. M. Nash on "The Economics of World Power." As indicating the outstretching character of the Conference, it was satisfactory to find that the Labour movement was embraced in it, Mr. J. P. Noonan, the president of the International Brotherhood of Electrical Workers, contributing a paper on "Labour's Part in Power Production," while equally useful were the contributions on "Industrial Welfare and Vocational Psychology" emanating from Austria and Holland. In the Publicity Section, Mr. J. W. Beauchamp, M.I.E.E., the director of the British Electrical Development Association, dealt at length with the object and work of that body, the subject eliciting in the subsequent discussion some useful information regarding American methods.

The last division of the volume is by no means the least important, dealing as it does with the question of "Technical and Commercial Education," and a study of the various papers can be commended not only to the managers of large electrical engineering undertakings, but to education authorities in all parts of the United Kingdom, and particularly to the principals of polytechnics and technical institutes. In particular we would refer to the paper on "Co-operation of Industry with Technical Schools," by Prof. Dr. Conrad Matschoss, director of the German Society of Engineers, Berlin.

Conclusion.

As to the value of the Conference, we cannot do better than quote a few of the remarks made by Mr. O. C. Merrill, the Executive Secretary of the United States Federal Power Commission, at the closing ceremony. "What we have accomplished here," said Mr. Merrill, "I consider too great both in its amount and in its value to be encompassed within the terms of any resolution that we would be prepared to discuss to-day. We have brought together here the leading technical experts from all over the world, and we have brought together in the papers presented to the Conference the greatest contribution, in my judgment, on the subject of power that has ever been brought together—a series of contributions that will serve as text books for engineers for many years to come."

Mention has already been made of the numerous plates of illustrations and maps and sheets of tabular information which, together with the large number of illustrations in the text pages, add materially to the value of the Transactions, inasmuch as some of these were not included in the papers at the time they were read or presented. The Transactions are also of value by reason of the fact that in response to a general invitation at the Conference many who were unable owing to time and other reasons to add their quota to the discussions have since submitted their remarks and many helpful suggestions to the organising secretary, who has included them in their respective places.

Each volume is provided with its own index of the titles and names of the authors of the papers, while to render them of value to foreign as well as to English-speaking engineers, a *résumé* in French follows all papers in English and, *vice versa*, an English *résumé* is given of all papers in French. In addition, many of the Italian papers have been completely translated into English. Thus, almost everything possible has been done to render the information contained in the Transactions available to engineers throughout the whole world, no matter what their nationality. There is no doubt that the language difficulty was a serious hindrance to securing the full advantage of the first Conference, and following the result of the recent Congress in Paris, it may be that in the case of future Conferences, Esperanto will become the official language not only for the papers but for the discussions.

At the request of many subscribers, a complete and comprehensive index to the Transactions has been prepared, and is available at a cost of £2 net. It consists of a volume of 600 pages, uniform in size with those of the Transactions, and comprises no fewer than 40,000 references, so that notwithstanding the variety of the matters touched upon in the papers and the subsequent discussion, it will be possible by means of the index volume quickly to locate any desired information.

The cost of the four volumes is £12. The publishers are also prepared to offer each one singly, and no doubt this will be of service to those who are only interested in certain aspects of power development and utilisation. A suggestion that we have to make, although perhaps a minor one, is that the year "1924," which is given on the title page of each volume, might also usefully be added to the gold lettering on the binding.

The International Railway Congress.

A Review of some of the Electrical Features.

THE tenth International Railway Congress was opened in London by H.R.H. the Duke of York on June 22nd, and was continued until July 2nd when the delegates left London and visited various parts of the country, including Darlington, where the centenary celebrations of the introduction of steam railways by George Stephenson were held. The International Railway Congress Association was formed in 1885 and holds its congresses at intervals of a few years in various countries; the last held in Great Britain was 30 years ago. The Association is composed of State railway administrations and has its headquarters at Brussels; the membership now consists of 235 administrations, representing 300,000 miles of line.

The Congress was divided into five sections, one of which dealt with electric locomotives, and three sessions were devoted to the consideration of reports from various parts of the world. The various sectional meetings were held in the buildings of the Institutions of Civil and Mechanical Engineers, the reports presented for discussion numbering over 50. The delegates numbered over 800 and came from every important country in the world, with the exception of Russia and Germany. Among the social events were a banquet at the Crystal Palace on June 25th, a reception on behalf of the British Government at Lancaster House, London—where the guests were received by the Minister of Transport (Col. W. W. Ashley) and Mrs. Ashley—and a concert at the Queen's Hall on June 26th, in addition to numerous excursions to works and places of interest in and around London, Canterbury Cathedral, Oxford, Brighton, and elsewhere. Subsequently the delegates were to visit Leeds, Harrogate, Darlington, Edinburgh, Glasgow and the Trossachs.

The Duke of York was thanked for opening the Congress by M. Foulon (president of the Permanent Commission of the Congress), and the Congress was addressed by the Minister of Transport, who referred to the fact that electric traction was now being recognised as the most efficient method of dealing with the conveyance of millions of workers of the great cities of the world and, considered in relation to its application to long-distance trains, was a subject of the greatest interest at the present time.

The Congress was also welcomed by Viscount Churchill (chairman of the Great Western Railway Co., who was elected president of the Congress), and after the opening ceremony, delegates proceeded to Whitehall, where a wreath was placed at the foot of the Cenotaph.

The presidents of the five sections were respectively:—

Mr. E. F. C. Trench, engineer-in-chief of the London, Midland and Scottish Railway (Section 1; ways and works).

M. M. Weiss, engineer-in-chief of the Swiss Federal Railways (Section 2; locomotives and rolling stock, including electric locomotives).

M. du Castel, director of railways to the French Ministry of Public Works (Section 3; railway working).

Dr. J. H. Parmelee (United States), (Section 4; general railway questions).

Signor G. Semenza (Italy), (Section 5; light railways and colonial railways).

On June 24th and 25th the various sections devoted themselves to the consideration of questions not connected particularly with electrical matters, and joint meetings of sections were held in cases where the particular matter under discussion was of interest to both. A matter of general interest was the practicability of the eight-hour day on railways, and resolutions were put forward in which the necessity for taking into consideration the special circumstances attaching to various railways was emphasised. After two days' discussion of the matter, however, no final decision was come to, and the discussion was resumed on the Thursday morning, when the matter was disposed of by the passing of a resolution which expressed the opinion that, after full statements by the representatives of the different countries, a rigid application of the eight-hour day was not possible.

Signalling: Electric Lighting.

On June 25th a great deal of attention was paid by Sections II and III to signals and signalling systems. The reporters on these subjects were:—Mr. W. H. Elliott, signal engineer to the New York and New Haven Central Railroad; Mr. W. J. Thorrowgood, signal and telegraph superintendent to the

Southern Railway, England; Mr. Carlo de Benedetti (chief signal engineer to the Italian State Railways), who dealt with Italy, Belgium, and Holland; Mr. T. Hard (Stockholm), who dealt with Denmark, Norway, and Sweden; and M. Laigle (Paris), who dealt with other countries. After discussing the position and colour of the light of fixed signals and similar matters it was recommended by the reporters that where electrical energy was available, its use should be substituted gradually for the oil lamps almost universally in use, preferably by using lamps with parallel filaments at the focus and comprising, for each main signal, one lamp lighted and another as a standby, with an indicator showing the extinction of each lamp and provision for the automatic lighting of the standby lamp. Lamps should be supplied with electricity from some source other than batteries of accumulators, even in the case of isolated signals.

Dealing with the track-circuit system of signalling, it was remarked that it was possible to work track circuits either by d.c. or a.c. on lines operating steam traction; alternating current cost more in the first instance, on account of the power transmission line, but it was less expensive to maintain on account of the absence of track and line batteries. Moreover, the a.c. track circuit was not affected by stray currents, which fact was of importance owing to the extension of inter-urban trolley lines, and the a.c. feeders which supplied the signals and track circuits could serve equally well for other uses, such as lighting a station, for example.

The applications of the automatic block, particularly in America and France, showed that this system completely met the requirements for working the traffic; it worked regularly and maintenance did not offer any special difficulties. The increased cost of labour during recent years, indeed, rendered the adoption of the automatic block system worthy of consideration from the point of view of economy not only in the equipment of new lines, but also for the transformation of the manual block system. The improvements that had been made in batteries and motors had rendered this operation easy by enabling the manual block signals to be retained.

The arguments in favour of the method of working with track normally open or track normally closed had been studied by the reporters, but they were of the opinion that the arguments either way were not sufficiently conclusive to enable a definite decision to be come to as to the advantages of the one system over the other. The main advantages of the closed track were greater safety and economy in maintenance, whilst the claim for the open track was reduced cost of installation. It was an account of the simplicity of the installatjon that the A.P.B. system, with track normally open, had been installed in America on single tracks, because this system enabled a large number of trains to be run.

In the course of the discussion on these reports, Mr. Thurrowgood expressed the opinion that a double-filament lamp was preferable to two single lamps, and he suggested one filament for ordinary use and one reserve filament having about 40 per cent. of the intensity of the ordinary filament. After further discussion, the paragraph in the reports relating to the substitution of electricity for oil in light signals, was modified to read as follows :—

"If suitable current is available, it might be advisable to substitute electric lighting gradually for the mineral-oil lamps almost universally in use; the technical measures on the systems which have adopted this method of lighting are in general that, in case of the lamp being extinguished, a standby and as far as possible a system of control shall be in operation."

Another suggestion made by the reporters was discussed, *viz.*, "Luminous signals having been brought to such a state of perfection as to give great efficiency and a great measure of safety, their use is to be recommended in areas in which an electricity supply is available, and particularly for use on lines worked by electric traction, in tunnels, in large stations, and on approaching stations." It was suggested by one of the French representatives that the wording of the above sentence was too strong, because the introduction of this system of signalling might, in certain circumstances, be very expensive. Another French delegate, on the other hand, spoke of the beneficial results which had followed the adoption of luminous signals and thought it advisable to consider the possibility of their use in those districts where electric power was obtainable, more especially on electrified lines.

The Banquet.

On the Thursday evening, June 25th, a banquet was given to the delegates at the Crystal Palace at which Sir Guy Granet (chairman of the Congress) presided, and was supported by Sir Philip Cunliffe-Lister (president of the Board of Trade), Lieut.-Col. Wilfred Ashley (Minister of Transport), and many other representatives of Government Departments and railways throughout the world, the company numbering some 1,500. There was nothing of direct electrical interest in the proceedings, the outstanding point being the emphasis laid upon the manner in which railways could develop the trade of a country and, by their inter-working, assist in the promotion of friendly relations between the nations of the world.

(To be continued.)

Business Notes.

Commercial and Industrial Developments, Business Changes, Trade Opportunities, New Publicity Literature, Liquidations and Failures.

The "Electrical Review" Index.—The Index for the last half-yearly volume of the ELECTRICAL REVIEW (January to June, 1925), will shortly be published. Copies will be forwarded post free to those requiring them for binding or for reference purposes, if they will make application to the Publisher, ELECTRICAL REVIEW, 4, Ludgate Hill, E.C.4.

Mullard Window Dressing.—We have received from the Mullard Radio Valve Co., Ltd., a picture of a window display at the premises of Mr. A. J. Selby, of Burton-on-Trent. This is a very effective piece of window dressing arranged with the aid of the company's publicity service.

Electrical Work at Wembley.—MESSRS. G. W. ROBINSON inform us that they have supplied the whole of the lighting equipment at the Burma Pavilion, for Messrs. Schweppes, Ltd., and are using similar reflectors to those used in the Ideal Home Exhibition gardens. These reflectors give an artificial sunlight effect. The firm has also supplied the whole of the water heating apparatus in this building, and has contributed to the flood lighting of the grounds. The large self-contained electric fountain, 6 ft. in diameter, which is fitted in the centre of the Australian Pavilion, was also provided by Messrs. Robinson, as well as the portable electric floor fountains at the Co-operative Wholesale Society's stand in the Palace of Industry and the fountain at the entrance of the Canadian Pacific Railway building.

Inquiries on Overseas Commercial Matters.—The Department of Overseas Trade desires to remind United Kingdom exporters requiring information on overseas commercial matters that it is always desirable to approach the Department rather than to write directly to the representative in the market concerned. Frequently the information desired is already available in the Department, and direct application to the Department thus results in the saving of much time. Where the information is not so available, the Department takes immediate steps to secure it and to forward it to the inquirer. It is particularly emphasised that the methods sometimes adopted of addressing the same inquiry simultaneously to the Department and its overseas officers leads to unnecessary duplication of work and to delay.

Staff Salaries at Glasgow.—The Glasgow Corporation Conditions of Service Committee, as an outcome of correspondence between the General Manager of the Electricity Department and the Electrical Power Engineers' Association, has decided that in cases of promotion under the schedule of salaries of the E.P.E.A., the increase in salary shall be made immediately, and not in three increments, as was the method in the original agreement with the E.P.E.A., and that this decision shall be given effect to in two cases submitted.

Radio Exhibition at Glasgow. — An exhibition of radio apparatus will be held in Glasgow in connection with the Housing and Health Exhibition which opens in the Kelvin Hall on September 23rd. The National Association of Radio Manufacturers and Traders is organising the exhibition, which will be all-British in its composition.

Electricity Workers' Wages.—In a recent letter to its constituents the District Industrial Council for the Electricity Supply Industry (West Midlands area) stated that in consequence of changes in the average cost of living index figures there would be a reduction of ¼d. per hour in the wages of adult employés as from July 1st; and also a corresponding decrease in the pay of youths and apprentices.

E.D.A. Activities.—In the latest pamphlet published by the British Electrical Development Association the dangers of dust are emphasised and it is pointed out that sweeping and beating carpets are very insanitary methods of cleaning them. The obvious alternative—an electric vacuum cleaner—is suggested.

An Eiffel Tower Advertisement.—A striking departure in the realm of advertising is the lease for eighteen months of the Eiffel Tower by the French firm of motor-car manufacturers known as Citroen. The firm is now engaged in fitting the well-known tower with electric light cables for a gigantic illumination of the tower on a groundwork of electric stars. The word "Citröen" will be marked in red flames of light 1,000 feet in length. The top of the tower which is 1,000 feet high, will be crowned with a huge red light which will be flashed over Paris every night.—*Financial Times.*

An "Exide Service" Convention.—On June 23rd and 24th over 240 representatives of "Exide" battery service agents took part in a convention at Hendon. Such subjects as constant potential charging, the repair of celluloid batteries, and the new Home Office regulations applicable to battery-repair shops were dealt with by experts to the visitors' advantage and consequently to that of their customers.

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Trade Mark Registration in Japan.—The Department of Overseas Trade informs us that in accordance with a new Japanese ordinance it is now possible to renew a "pre-earthquake registration at any time upon payment of a small fee, although the original period laid down for such re-registration terminated on April 30th last. The amendment is therefore tantamount to an indefinite extension of the original period.

Trade Announcements.—THE SUN ELECTRICAL CO., LTD., states that all communications relative to its business in the Midland area should in future be addressed to the head office. The branch agency for Birmingham and district, held for several years by the County Engineering and Lighting Co., has been terminated.

The firm of BASTIAN & ALLEN, water heating specialists and manufacturers of the Bastian geyser, has now amalgamated with the Bastian Meter Co., Ltd., thus combining the two firms started by the late Mr. C. Orme Bastian. The central offices of the concern will be 58, Haymarket, S.W.1, and all correspondence should be addressed there.

MESSRS. JOHN M. HENDERSON & CO., LTD., makers of hoisting and transporting machinery, have removed their London office to Amberley House, 12, Norfolk Street, Strand, W.C.2. Telephone: Central 8927. Telegrams: "Needreba, Estrand, London."

MESSRS. PETER BROTHERHOOD, LTD., have opened a branch office at 324, Harrogate Road, Leeds, from which Mr. E. Markham will represent them in Yorkshire, Durham, Northumberland, and the Grimsby area.

The address of WALKER VEHICLES, LTD., is now Clare House, Kingsway, W.C.2. Telephone: Gerrard 6964; telegrams: "Walkveco, Westcent, London."

Bankruptcy Proceedings.—W. R. GRIGSBY, electrical factor, 184, Grays Inn Road, W.C., trading as the Wenham Lighting Corporation.—The first meeting of creditors under this failure was held on June 23rd at Carey Street, W.C. The receiving order was made on the petition of Drake & Gorham Wholesale, Ltd. The Official Receiver reported that it appeared that debtor took over the business, which was insolvent at the time, paying the creditors a composition of 5s. in the £. After the armistice the debtor devoted most of his attention to the electrical side of the business, but he was unable to make a success of it. In 1924 he made a heavy loss on the sale of goods to Mr. J. W. Clark, who had secured a contract for lighting at Wembley. He entered into a partnership deed with that gentleman's wife, it being agreed that they should share the profits equally, and that he should supply Clark with goods for the contract in the usual way of business and allow him extended credit. Mr. Clark was, however, unable to pay for the goods supplied to him by the debtor. The latter had further stated that he had been held liable for goods supplied to Clark by the petitioning creditors, who obtained judgment on the ground that he was Clark's employer and as a result instituted those proceedings. A further cause of his trouble was that a traveller left his employ and started on his own account, taking away some of his customers. A private meeting of the creditors was held in April last, when an offer of a composition of 10s. in the £ was rejected and a deed of assignment was executed in favour of a trustee who had since employed the debtor as manager. No statement of affairs was lodged, but the debtor returned £1,300 as due to cash creditors, and a like amount to the trade; he valued his assets at £240 and attributes his failure to bad debts, depreciation of stock, and to the loss of the action brought by the petitioning creditors. Mr. E. H. Hawkins, I.A., 4 Charterhouse Square, E.C., was appointed trustee.

D. D. RAYNER, 6, Wilson Street, Derby, engineer.—The public examination of this debtor was held on June 23rd at the Court House, Derby. The statement of affairs showed liabilities of £539, against assets of £101. It appeared that in 1919 debtor started trading on his own account as an electrical engineer, with borrowed capital. In conjunction with another he took premises in Duke Street, Derby, and in the first nine months between £4,000 and £5,000 was advanced by the gentleman who had lent debtor his capital, the idea being that a company should be formed. The company was floated in November, 1919, with £10,000 capital, debtor being appointed managing director, and during the latter end of the boom period the company was successful. In September, 1922, the debenture holders took possession, debtor continuing as manager for a year at £600 without commission. In September, 1923, his wife started business with debtor as manager, and electrical motors were assembled, the sum of £200 being borrowed by his wife from relatives, and £600 from debtor's sisters. In March, 1924, another gentleman provided £250 and became a limited partner. The examination was closed.

J. E. CRACKNELL, High Street, Manningtree, Essex, photographer and wireless supplies dealer.—The first meeting of the creditors of the above was fixed to be held on June 23rd at 9, Arcade Street, Ipswich. The statement of affairs showed gross liabilities of £499, of which £497 was unsecured, against net assets of £195, leaving a deficiency of £302. Debtor attended for his public examination at Colchester Bankruptcy Court on June 25th before Mr. Registrar Bridgeman. He stated that he commenced business in 1922 with a capital of £15, and £37 which he borrowed, and later took up the radio business. His trade last year averaged from £15 to £20 a week, on which the profit was 25 per cent. At the end of January last trade fell off and left him with heavy stock, the value of which declined. His expenses increased and the more business he did the worse off he became financially. The examination was formally adjourned to July 13th.

NATHAN ABRAHAM LUDWIN, trading as N. A. Ludwin & Co., export merchants, &c., 122, Bunhill Row, E.C.—The first meeting of creditors herein was held on June 25th at the London Bankruptcy Court before Mr. E. Parke, Official Receiver. The debtor was neither present nor represented, and it was stated that he was under remand on a charge of conspiracy. The Official Receiver reported that, according to the debtor's statements, he came to this country from Russia in 1914, and started business five years later on his own account. He took the Bunhill Row premises two years ago, and in April, 1924, being short of capital, his brother sent him £1,000 worth of electrical goods. The debtor roughly estimated his liabilities at £12,000, against assets valued at £800, and he attributed his failure, among other causes, to depreciation in the value of radio goods and trade depression. A resolution was passed for Mr. E. H. Hawkins, I.A., 4, Charterhouse Square, E.C., to act as trustee and administer the estate in bankruptcy. The following are creditors:—

	£		£
J. Flower	145	F. H. Palmer	447
Igranic Electric Co., Ltd. ...	488	A. J. Stevens & Co. (1914), Ltd.	314
L. A. McAlister	110		

J. A. REFOY, trading as the Varley Radio Co., 178, Ancona Road, Plumstead, S.E.18, Kent, dealer in radio apparatus.—The public examination of this debtor was held recently at the Court House, Greenwich. The statement of affairs showed liabilities of £1,119, against assets of £34. Debtor stated that he commenced business in partnership with another in October, 1922, but the partnership was dissolved in May, 1924. He took over the business, although he knew it was in financial difficulties, as he hoped to be able to pull it round. He removed to his present address and his wife advanced him considerable sums to carry on. He attributed his failure to bad management and bad trade. He stated that he made a guaranteed offer of 10s. in the £ to be paid by his wife, but this was not accepted. The examination was adjourned.

RADIO CASH STORES, 371, Upper Street, Islington; also at Leeds and Nottingham.—The accounts under this failure, particulars of which appeared in our issue of June 12th (p. 931), show liabilities of £1,111 and no assets. The following are among the creditors:—

	£		£
Pressland Electric Supplies, Ltd.	126	H. Jacobi & Co., Ltd.	38
Holttmin & Green, Ltd.	38	South Wales Wireless Co., Ltd.	26
Nottingham City Council ...	91	W. Bullen	27
John Bull Radio Supplies Co. ...	20	A. Lee & Co.	66
J. R. Morris	21	Marconiphone Co., Ltd.	56
McLeod & McLeod	24	Wellington Electric	30
E. A. Wood	58	C. McIntosh & Co., Ltd. ...	28
Wholesale Fittings Co., Ltd. ...	25	Swansea Borough Council ...	30

J. R. PATTISON, 15, Goldsmith Street, Nottingham, electrical supplies factor.—The first meeting of creditors was held on June 26th at the Official Receiver's offices, Nottingham. The statement of affairs showed gross liabilities of £2,707, of which £2,266 was expected to rank, against assets of £280, leaving a deficiency of £1,986. Debtor attributed his failure to buying on a falling market, bad debts, keen competition, and the pressure of creditors. The sales for the past year were estimated at £2,787, on which a gross profit of £437 had been made, while the working expenses totalled £436. Debtor became aware of his position in 1923, and for some time had been pressed by creditors. The matter was left with the Official Receiver as trustee of the estate.

THE C. C. S. TRADING CO., 30, Western Mail Chambers, Cardiff, electricians.—The first meeting of the creditors of the above was held on June 26th at Cardiff. No statement of affairs had been filed, and the failure was attributed to bad trade and heavy working expenses. The matter was left in the hands of the Official Receiver as trustee of the estate.

C. B. MAURICE, cable suppliers, late of Windsor House, Victoria Street, S.W.—First meeting, July 7th; public examination, October 6th, both at Carey Street, W.C.

S. C. RAPSON, C. L. BURRILL, and A. J. HEFFER (Suburban Electrical & Maintenance Co.), electricians, 2, Plough Yard, Shoreditch, E.—Trustee Mr. W. A. J. Osborne, Balfour House, Finsbury Park, E.C., appointed June 19th.

A. W. BOULD, electrician, 29, High Street, Skipton.—Trustee, Mr. W. Durrance, Official Receiver, 12, Duke Street, Bradford, released June 17th.

C. K. WALLIS, electrical engineer, 51, Mons Avenue, Bognor.—Trustee, Mr. G. H. Acheson, Official Receiver, 12a, Marlborough Place, Brighton, released June 18th.

H. P. TUCKER, electrician, Empire Bungalow, Ellacombe, Torquay.—Trustee, Mr. S. V. Upham, 23, Fleet Street, Torquay, released May 27th.

G. E. HARRIS, plumber and electrical engineer, 14, North Street, Emsworth, Hants.—Trustee, Mr. H. B. Morris, 29, Pearl Buildings, Portsmouth; released June 4th.

E. DOWNING (lately carrying on business in co-partnership with E. J. Mills, as manufacturers of electrical conduit fittings and general electricians, at 143, Butts Road, Walsall), Osborne House, Regent Street, Willenhall.—First and final dividend of 13s. in the £, payable at the Official Receiver's office, 30, Lichfield Street, Wolverhampton.

E. W. J. WHITELOCK, electrical engineer, 4, Leagrave Road, and 7, Cheapside, Luton.—Trustee, Mr. T. Keens, 11, George Street West, Luton, released March 17th.

C. BINNS (United Electric Co.), electrical engineer, 55, Low Briggate, Shipley.—Last day for proofs for dividend, July 10th. Trustee, Mr. J. O. Morris, Official Receiver, 12, Duke Street, Bradford.

H. W. W. ALFORD, wireless engineer, 18, Goldsmith Street, and 261, High Street, Exeter.—First and final dividend of 1s. 10½d. in the £, payable at the Official Receiver's offices, 67, High Street, Exeter.

J. E. BYRNE, electrical contractor, 3, Wells Yard, Waterworks Street, Kingston-upon-Hull.—First and final dividend of 2s. 2d. in the £, payable July 3rd, at the Official Receiver's office, 37, Scale Lane, Hull.

Company Liquidations.—IMPERIAL MOTOR INDUSTRIES, LTD., 11, Denmark Street, Charing Cross Road, W.C.2.—A meeting of the creditors of this company was held recently; the chair was occupied by Mr. T. J. Bond, of Messrs. Cole, Bond & Co., C.A. The chairman stated that the company had appointed him to act as liquidator in the voluntary liquidation of the company, in conjunction with Mr. C. Latham, of the Automobile Trades Guardian Association. A statement of affairs was submitted, as at June 4th, which disclosed liabilities of £39,440. The assets amounted to £16,839 from which had to be deducted £1,732 for preferential claims, leaving net assets of £15,107, or a deficiency, so far as the creditors were concerned, of £24,332. The company was formed in 1917 with an authorised capital of £4,000, all of which was issued for cash, and took over as a going concern an existing business. For the first three or four years of the company's existence reasonably good profits were made. The losses for the years to July 1922 and 1923, were considerable, but at July, 1924, although a loss was incurred, it was very substantially reduced, and the directors were hopeful that the corner had been turned. Mr. Bond added that the directors backed their optimism by loaning to the company large sums of money, in respect of which no debenture was taken, and subject to the voluntary liquidation going through, they were prepared to forego their interest on the amounts loaned as from July, 1922. Since their appointment, the liquidators had continued to carry on the business on a somewhat modified basis in the hope of being able later to dispose of it as a whole.

It was decided to confirm the voluntary liquidation of the company, with the present liquidators, and an advisory committee, consisting of representatives of Lodge Plugs, Ltd., Three Star Accumulators, Ltd. Tangyes, Ltd., Acme Electrical, Ltd., and Rankin Bros., was appointed.

The following are creditors:—

	£		£
Lodge Plugs, Ltd.	551	Heilbronn, Felix	130
Three Star Accumulators, Ltd. ...	536	General Electric Co., Ltd. ...	121
Robinhood Engineering Works...	476	Autovac Mfg. Co.	121
Tangyes, Ltd.	418	Sphinx Sparking Plug Co., Ltd.	106
Acme Electrical, Ltd.	369	Sun Electrical Co., Ltd.	82
Vandervell, C. A., & Co., Ltd....	272	British Thomson-Houston Co., Ltd.	51
Obermer, S.	218	Park Bros.	71
Champion Sparking Plug Co. ...	209	Butlers, Ltd.	66
Powell & Hanmer, Ltd.	198	Lake & Elliott, Ltd.	60
Lucas, Jos., Ltd.	179	Benjamin Electric, Ltd.	55
Stephens, R., & Sons, ...	168		

BROTHERTON EDISWAN TUBES & CONDUITS, LTD.—A meeting of members is called for July 27th at the Victoria Hotel, Wolverhampton, to hear an account of the winding up from the liquidator, Mr. R. H. Johnston.

KEARNEY HIGH-SPEED RAILWAY CO., LTD.—First meeting of creditors and contributories, July 7th, at Carey Street, W.C.

Private Arrangements. — BASIL EDWARD CROW, trading as Crow, Toogood & Co., electrical and wireless supplier, 18, Charing Cross Road, W.C.2, and at Eastbourne and Bournemouth.—A meeting of the creditors of the above was held on June 23rd, at the London Chamber of Commerce when Mr. P. Houstoun, who represented one of the principal creditors, was elected to the chair. Mr. W. M. Whyte reported that a deed of assignment had already been executed by the debtor. The latter commenced business in 1920, and at the outset a fair profit was made. During 1924, however, trade was very bad and at the end of that year there was a deficiency of £2,180. The debtor then borrowed sums aggregating £850, which were put into the business in the hope that trade would revive. Unfortunately, that had not been the case, and the debtor finally came to the conclusion that the best thing to do in the interests of all concerned was to assign his assets to a trustee. The statement of affairs showed liabilities of £5,238, there being 135 trade creditors whose claims aggregated £2,881, and there were cash creditors for £2,357. The assets were estimated to realise £1,255, less £119 for preferential claims, leaving net assets of £1,136, or a deficiency of £4,102. Mr. Whyte added that probably £950 would be available as net assets, or 3s. 6d. to 3s. 8d. in the £ for the creditors. A number of creditors had assented to the deed. A creditor asked when Mr. Toogood retired from the business, and it was stated that there was a dissolution last March, when the debtor took over the assets of the business and agreed to discharge all the liabilities. Subsequently a further deed of dissolution was entered into. When Mr. Toogood left the partnership he commenced a similar business on his own account, which he had since disposed of. Mr. Toogood did not receive anything when he left the partnership.

The debtor was called into the room, and in answer to questions said that when the dissolution of partnership took place a notice of the fact was sent to the ELECTRICAL REVIEW and to the Business Names Registry. So far as he knew the creditors were not advised of the dissolution. When the business was commenced, money was advanced by certain gentlemen under an agreement which provided that they should receive 10 per cent. per annum interest and a varying share of the profits. The chairman said that if that statement was correct then his view was that the creditors who advanced money under the agreement could not rank in competition with the other creditors. The liabilities would have to be reduced accordingly. In answer to further questions, the debtor said that he recently borrowed £100, and as security gave a bill of sale on his furniture. That money was required as the Sheriff was in possession at London and Bournemouth. Asked what the drawings of the partners had been, the debtor said that they each received £10 a week, although latterly the amount had been reduced. It was decided that the matter should be dealt with under a deed of assignment to Mr. W. A. J. Osborne, of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C., as trustee, failing which the estate should be dealt with in bankruptcy.

HUGH MCTAGGART, trading as H. McTaggart & Co., 4, Edward Terrace, Cardiff, wholesale distributor of electrical and radio goods.—A meeting of the creditors of the above was held recently at the offices of Messrs. Jones, Robathan & Co., Cardiff Docks, when a statement of affairs was submitted which disclosed liabilities of £3,527, of which £3,397 was due to the trade and £130 to the bank. The assets were estimated to produce £2,753; from this had to be deducted £19 for preferential claims, leaving net assets of £2,734, or a deficiency of £793. It was reported that the debtor commenced trading in February, 1924. He had previously been associated with a well-known company in the trade. He applied to be admitted as a member of the N.A.R.M. in order that he might obtain the wholesale terms, but it was not until the beginning of the current year that his application was granted. It appeared that purchases to the extent of something like £1,300 from members of the N.A.R.M. had to be disposed of at cost price, and no profit or special discount was obtained. When he was admitted to the N.A.R.M. one of the conditions was that he immediately purchased stock to the value of £500, of which about 50 per cent. was still unsold. During the first three months the debtor expended a substantial amount in advertising, and the sales had shown a steady increase. The debtor attributed his present position to the loss of the special discounts from the N.A.R.M. members, to general bad trade in South Wales, bad debts, and to over-estimating the amount of stock required to carry on the business. During the fourteen months to March last the debtor's turnover was between £9,000 and £10,000. It was decided to appoint a committee to consider a scheme for the payment of the debts in full.

Bankruptcy Order Annulled. — E. A. THORN, house decorator and electrical engineer, carrying on business at 22, Mossbury Road, Clapham Junction, S.W. Adjudication and receiving order of July, 1910, annulled June 18th, 1925; debts, costs, charges and expenses of the bankruptcy having been paid in full.

Deed of Arrangement.—HAROLD PETERS, 5, York Road, Colwyn Bay, trading as the Peters Electric Co.—The trustee under a deed of arrangement, Mr. P. W. Aston, Colwyn Bay, reports that the net realisations totalled £322. A dividend of 2s. 1d. in the pound has been paid on an amount of £1,598.

Dissolution of Partnership.—SAXTON & WELLS, mechanical and electrical engineers, Dawson Street, Hyde, Chester.—Mr. R. Saxton and Mr. W. C. Wells have dissolved partnership. Mr. Wells will attend to debts and continue the business under the same style.

Catalogues and Lists.—THE LONDON ELECTRICAL CO., LTD., 1, Sherborne Lane King William Street, E.C.4.—A net trade price list of electrical materials and accessories, and an illustrated catalogue of domestic appliances.

MESSRS. J. HOPKINSON & CO., LTD. Britannia Works, Huddersfield.—List No. 1,830, describing a number of the company's "all-metal" draught gauges.

AUTOVEYORS, LTD., 84, Victoria Street, S.W.1.—A series of illustrated and priced pamphlets, giving particulars of "Clix" connectors, loop aerials, condensers, and many other radio accessories.

THE STEAM FITTINGS CO., LTD., West Drayton, Middlesex.—Two illustrated pamphlets dealing respectively with the "Drayton" automatic temperature regulator and steam-pressure reducing valves.

THE ELECTRICAL EQUIPMENT & CARBON CO., LTD., Bank Buildings, 109-111, New Oxford Street W.C.1.—List No. R3, illustrating and describing "Telwave" condensers, jacks, switches and other radio components. Priced.

THE MARCONIPHONE CO., LTD., Marconi House, Strand, W.C.2.—A well-illustrated brochure dealing with the company's speech and music amplifying service for large public gatherings.

MESSRS. EVERSHED & VIGNOLES, LTD., Acton Lane Works, Chiswick, W.4.—List No. D158, illustrating and describing a traction recorder for electric railway working.

PERFECTION ELECTRIC HEATERS, Hillside Works, Bard Street, Sparkhill, Birmingham.—A folder containing illustrations and prices of the company's irons, kettles, grills, &c.

MESSRS. H. E. ASHDOWN (BIRMINGHAM), LTD., Perry Barr, Birmingham.—A priced catalogue of cabinet radio receiving sets, condensers, loud speakers, &c.

MESSRS. BELBIN & BOWDEN, LTD., 3, Finsbury Square, E.C.2. —A leaflet giving prices of "Bow Bells" incandescent electric lamps.

THE HART ACCUMULATOR CO., LTD., Stratford E.15.—List No. 164, describing the Hart "Magno" accumulator for use with dull-emitter radio valves. Priced.

THE NEW ITALIAN ART ASSOCIATION, LTD., 28, Newman Street, W.1.—A priced and illustrated catalogue of English and Italian alabaster bowls and fittings.

MESSRS. A. J. STEVENS & Co. (1914), LTD., Walsall Street Branch, Wolverhampton.—A novel showcard, representing a number of the firm's radio receiving sets and a loud-speaker, in attractive colours.

VENNER TIME SWITCHES, LTD., 45, Horseferry Road, S.W.1.—Lists Nos. 22 to 26, dealing with shop-window and street-lighting time switches, oil-break time switches, an automatic electric buoy lamp, and other switching apparatus.

THE STIRLING BOILER CO., LTD., 32 and 33, Farringdon Road, E.C.4.—A well-illustrated brochure containing descriptions of the company's "tri-drum" boilers and their employment.

BRITISH INSULATED & HELSBY CABLES, LTD., Prescot, Lancs.—Pamphlet P190, describing the company's corrosion-proof armoured cables.

MESSRS. PRITCHETT & GOLD & E.P.S. Co., LTD., 50, Grosvenor Gardens, S.W.1.—A series of photographic views of "Dagenite" battery plates after severe tests in comparison with a foreign battery over a period of 18 months.

Book Notices. — "Illumination Engineering Nomenclature, and Photometric Standards."—The eighth edition of the complete nomenclature adopted by the American engineering societies in accordance with American Engineering Standards Committee procedure. This edition was approved as an American standard, April 29th, 1925.

The Brown Boveri "Review."—Vol. XII, No. 6. June, 1925. London: The British Brown Boveri Ltd.

"Annali dei Lavori Pubblici gia Giornale del Genio Civile." Vol. LXIII, No. 4. April, 1925. Rome: A. de Gaetani.

"Jahrbuch der Elektrotechnik," by Dr. K. Strecker. Munchen: R. Oldenbourg.

"Science Abstracts" A and B. Vol. XXVIII. Part 6. July 25th, 1925. London: E. & F. N. Spon, Ltd. Price 3s. each.

"*Journal* of the American Institute of Electrical Engineers." Vol. XLIV, No. 6. June, 1925. New York: The Institute. $1.

"Time Standardisation of Workshop Operations," by T. Pilkington. Pp. x+253; figs. 91. London: Sir Isaac Pitman and Sons, Ltd. Price 16s. net.

"Electrical Machinery Erection," by T. Croft. Pp. ix+314; 334 figs. London: McGraw Hill Publishing Co., Ltd. Price 15s.

"The Broadcasting Time Table and Reception Log," compiled by R. Grierson. Fourth edition. 32 pages. London: Chapman & Hall, Ltd. Price 2s. 6d. net.

"Memoirs of the College of Engineering," Kyoto Imperial University, Japan.—Vol. II, No. 7, "Theory of Distortionless Alternators," "Theory of Two- and Three-phase Generators" and "Theory of Single-phase Generators"; Vol. III, No. 5, "Formula for the Strength of Struts, &c."; Vol. III, No. 6, "On the Age-hardening of Aluminium-rich Al-Zn Alloys," &c.; Vol. III, No. 7. Published by the University.

"The Selected Papers from the *Journal* of the Institute of Electrical Engineers of Japan."—No. 1, The electromagnetic induction and the effective self-inductance of a rectilinear transmission line with earth return, and the potential difference of the earth surface; No. 2, On the continuity of vector power in an alternating electric and magnetic current field; No. 3, On the induction synchronous motor characterised by automatic transition; No. 4, Transient phenomena in a short-circuited alternator. Tokio: The Institute of Electrical Engineers of Japan.

"Power Switchboard and Switching Equipment Handbook," 1st edition, May, 1925.—Issued by the Electric Power Club, B. F. Keith Building, Cleveland, Ohio, U.S.A. Price 50 cents. Contains the Club's instructions for the installation, operation and care of switchgear; definitions, abbreviations and symbols relating to switchgear; and the adopted standards, safety standards and practices of the club. "Instructions for Care and Operation of Transformers," 3rd edition, May, 1925. Issued by the Electric Power Club. Price, 25 cents.—Contains the club's instructions dealing with the handling, storage installation and operation of both power and distribution transformers.

Scientific Papers of the U.S.A. Bureau of Standards.—No. 502, "An Improved Type of Wavemeter Resonance Indicator." (5 cents.)

Quarterly *Bulletin* of the Institution of Engineers, Australia. Vol. II, No. 6. April, 1925. Sydney: The Institution.

Indian Railway Developments.—In the course of a report on trade conditions in India, *Reuter's Trade Service* states that the Madras and Southern Mahratta Railway has in hand the construction of a marshalling yard at Tondiarpet, increased lighting arrangements, renewal of rails, girders and engines, and the elimination of level crossings. The Nizam's Guaranteed State Railway has in hand a big scheme for overhauling the old workshops at Lalaguda and remodelling them for the requirements of the next ten to fifteen years. It is estimated that the provision of suitable cranes, and pneumatic and electrical equipment alone will amount to nearly Rs. 5 lacs. Mr. G R. G. Huddleston is in charge of this remodelling scheme.

Social Events.—On June 20th, the staff and employés of Messrs. J. & W. B. Smith, Ltd., held their first annual outing, sports meeting, and social evening, the *venue* being "Ye Old Rye House." The sports programme proved very enjoyable and at its conclusion a "meat tea" was served, at which Mr. Sloper proposed the toast of "The Firm and Directors," Mr. A. H. Miller, managing director, responding. Mrs. A. H. Miller presented the sports prizes, and a concert and dance were then held concurrently.

Some 130 members of the Blackpool Tramways Employés' Institute held their annual trip on June 25th, when Ambleside was visited.

The annual summer outing of the staff and employés of the Ayrshire Electricity Board took place recently, the party numbering 160.

Over fifty members of the staff of the Engineering Department of the Blackpool Corporation tramways journeyed by motor coach to York for their annual outing last week.

Mexican Railway Electrification.—At the recent annual meeting of the Mexican Railway Co., Ltd., the chairman (Mr. V. W. Yorke), said that the work of electrification had been considerably delayed by the revolution, and it had not been possible to commence the services until October last. Since that time their experience had proved that the system was absolutely efficient and would result in reduced expenditure.

A Travelling Electric Home.—An effective tableau was arranged by the Grimsby Corporation Electricity Works (engineer, Lt.-Col. W. H. Vignoles), in connection with a recent fancy dress parade in aid of the Grimsby Hospital. This took the form of an "electric home" mounted on an electric

A Travelling Electric Home at Grimsby.

vehicle. As will be seen from the accompanying illustration, prominence was given to electric cooking. The attendants were dressed in powder-blue and white costumes and the display was justly awarded a prize.

Peace in Industry.—An extraordinary general meeting of the Industrial League and Council was held on June 24th under the presidency of Sir Ernest J. P. Benn, Bart., and the amalgamation of that body with the National Alliance of Employers and Employed was unanimously agreed upon. The agreement of the National Alliance had already been registered at its annual general meeting in May. With the exception of the necessary formal ratification and the settlement of minor details, the fusion is now complete. The programme of the new organisation will be a complete combination under a single control of all branches of activity hitherto pursued by both the old societies. New and far-reaching developments are in contemplation. The control will be vested in joint committees on which representatives of employers and trade unionists will be in equal numbers. As hitherto, associate membership is open to all individuals who accept the principles and constitution.

A French Company's Activities. — The Compagnie Electro-Mécanique reports that the results for 1924 (no dividend) were due to the unfavourable situation of the market. In the steam turbine branch the machines for 35,000- and 60,000-kW sets ordered last year were in course of erection, and the company also booked orders for turbines and turbo-generator sets of all powers up to 16,000 kW. The 150,000-V installations for the Southern Railway Co. and those at 120,000 V for the Société Hydro-Electrique de Lyon and the Forces Motrices du Rhône were put into operation. Orders have been booked for two new alternators of 10,000 kW at 16,000 V, while the production of small alternators is being developed to meet the large demand for rural electrification.

Copper, Lead, and Rubber Prices.—Messrs. F. Smith and Co. report, June 30th:—Copper (electrolytic) bars £64, 2s. 6d. increase; ditto ditto sheets, no change; ditto ditto wire rods, £74, 2s. 6d. increase; ditto ditto h.c. wire, 9¼d., 1/16d. decrease. Messrs. James & Shakespeare report, June 30th:—No change in the prices for copper bars (best selected), sheet and rod, and English pig lead.

Messrs. E. Till & Co. report, June 30th:—India rubber, Para, fine, 2s. 9¼d., 2¼d. increase.

New Belgian Company.—A new company has lately been formed in Liége with a capital of 1,500,000 fr., and the title La Société de Halage Electrique to establish a system of electric haulage on the Liége-Maestricht canal.

British Trade Mark Applications. — The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from the dates mentioned below. In the case of foreign applications, the names and addresses of the British representatives are also given :—June 10th.—

Brandes (lettering and design). No. 455,642. Class 8. Radio receiving apparatus and parts thereof.—Brandes, Ltd., 296, Regent Street, W.1.

C.S.-Eones (lettering and design). No. 457,080. Class 8. Apparatus for use in radio-telegraphy and telephony.—C. F. Smith and R. Craik, trading in co-partnership, 41, Allen Street, Goswell Road, E.C.1.

Russell's genuine hertzite crystal (lettering and design). No. 457,997. Class 8. Hertzite detector crystals for use in radio-telephony.—L. G. Russell, 1-7, Hill Street, Birmingham.

Tropaformer. No. 458,379. All goods in Class 8.—R. A. Rothermel, Ltd., 24-26, Maddox Street, W.1.

Wunderway. No. 458,574. Class 8. Instruments and apparatus and parts thereof for use in radio-telephony and telegraphy.—Steels & Busks, Ltd., Ariel Works, Temple Road, North Evington, Leicester.

Ethodyne. No. 458,601. Class 8. Receivers for use in radio-telephony and telegraphy.—Burndept Wireless, Ltd.

X-Ray. No. 453,833. Class 13. Shades and reflectors of ordinary metal for use in connection with electric lighting.—British Thomson-Houston Co., Ltd.

June 17th.

Hermitic. No. 454,469. Class 8. Electric condensers.—Thomas Hougn, 62, Glengall Road, S.E.15.

Bico (lettering and design). No. 457,486. Class 8. Instruments and apparatus and parts thereof for use in radio-telephony and telegraphy.—The Brisco Importing Co., Ltd., 9, Aston's Quay, Dublin.

Romar. No. 458,174. All goods in Class 8.—Joseph Perkins & Sons, Ltd., Albion Works, Astwood Bank, Redditch.

Superdyne. No. 458,602. Class 8. Receivers for use in radio-telephony and telegraphy.—Burndept Wireless, Ltd.

Seva (lettering and design). No. 458,111. Class 13. Electric soldering irons.—E. O. Johansson, 6, Rorstrandgatan, Stockholm (C. W. Cedervall, Swedish Chamber of Commerce, 14, Trinity Square, E.C.3).

June 24th.

Electrad (lettering and design). No. 456,036. Class 8. Apparatus for radio-telegraphy and telephony.—Electrad, Inc., 428-430, Broadway, New York (White, Langner, Stevens & Parry, Jessell Chambers, 88-90, Chancery Lane, W.C.2).

Palaphone. No. 456,177. Class 8. Apparatus for use in radio-telegraphy and telephony.—T. Morch, 67, Mount Pleasant Lane, Upper Clapton, E.5.

Izon. No. 456,529. Class 8. Apparatus for use in radio-telegraphy and telephony.—W. Watson & Sons, Ltd., 313, High Holborn, W.C.1.

Red Diamond (lettering and design). No. 457,318. Class 8. Apparatus for use in radio-telegraphy and telephony.—Jewel Pen Co., Ltd., 76, Newgate Street, E.C.1.

Red Seal (lettering and design). No. 457,909. Class 8. Instruments and apparatus for use in radio-telephony.—D. B. Tippetts, The Spinney, Grange Road, Dorridge, Warwickshire.

C. G. H. Mellowtone (lettering and design). No. 458,366. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Midland Radiotelephone Manufacturers, Ltd., Brettel Lane Works, Stourbridge.

Superbalite. No. 458,293. Class 50. Electrical insulating material.—Società Moriti & Martini, 51a, Via Bergamo, Milan, Italy (Mewburn, Ellis & Co., 70-72, Chancery Lane, W.C.2).

A British Company and Mexican Taxation.—The *Financial News* states that it is reported from Orizaba that the Mexican Light, Power and Traction Co. under the tax revision must pay 25,000 pesos bi-monthly, increasing the total taxes to 375,000 pesos yearly, whereas the income of the company is given as 250,000 pesos. It is also reported that the company will be placed under an embargo for non-payment of taxes, but the report is not credited by the British Consul, Mr. King.

Business Opportunities in Czecho-Slovakia.—In a recent report the British Commercial Secretary at Prague states that there are openings for many classes of British goods in Czecho-Slovakia. One of the classes specially mentioned is electrical machinery, although in this direction, it is stated, Switzerland and Germany are serious rivals.

For Sale.—Taunton Corporation Electricity Department, owing to change of system, invites offers for surplus generating plant, including two 150-kW generating sets, alternators, transformers, &c. The Section Engineer, N. Section, Met. Power District, Mount Pleasant, invites offers for surplus generating plant. (See our advertisement pages to-day.)

German Cable Orders.—It was stated at the recent annual meeting of the Felten and Guilleaume Co. that the company had just received an order for a multiple-conductor lead telephone cable for laying between Holland and England. Negotiations were on the point of being concluded with the German Atlantic Telegraph Co. for the delivery by the Nordenheim works of a submarine cable to be laid between Emden and the Azores.

United States Electrical Exports. — The preliminary statistics of exports of electrical goods from the United States during April show that their total value was $7,817,184, an increase of almost $400,000 upon the April, 1924, figures, and of $100,000 upon the preceding month's total. Comparing April, 1925, with the same month of the previous year, it is seen that there was a large decline in the shipments of generators, steam turbo-generator sets, and parts; power and distribution transformers; large motors; switch and fuse-gear; and electric locomotives. Smaller decreases occurred in the cases of fans, telephone apparatus, ignition apparatus, and carbon products. The principal increases were in respect of self-contained generating sets (62 per cent.) batteries, converters, switchboards, meters (81 per cent.), motor starting and controlling equipment, lamps, flashlamps and searchlights, and domestic appliances. Radio apparatus experienced a phenomenal rise—from less than $300,000 in April, 1924, to over $850,000 in April last. Smaller increases occurred in the export of wiring supplies, porcelain, and insulated copper wire.

The Burden on Industry.—In the course of his speech at the annual meeting of Ruston & Hornsby, Ltd., on June 22nd, Mr. J. S. Ruston referred to the heavy burdens which industry had to bear whether it was making a profit or not. He said that unemployment and health insurance cost the company £25,000 a year and the new proposals would add a further £6,000. On the top of that the poor and district rates amounted to £31,000 per annum, making a total of £60,000 a year. In dealing with the company's productions, Mr. Ruston said that it had supplied a further number of the largest excavating machines ever constructed, both steam and electrically operated. The boiler works was fully occupied. A large number of electric power stations had adopted the company's vertical oil engines of sizes up to 1,100 h.p. In spite of any cheapening of electrical power they hoped still to obtain orders in direct competition.

Low-Temperature Distillation Plant.—International Combustion, Ltd., informs us that its American associated company has obtained a contract for installing a large low-temperature distillation plant for the Milwaukee Electric Light & Power Co.

Unemployment.—There was a fall of 10,490 in the number of registered unemployed in the week ended June 15th, the total at that date being 1,280,700.

Chinese Notes.—The *Chinese Economic Bulletin* states that a number of capitalists are organising an electric lighting company at Tsangchow, Chihli province. A temporary office has been opened at Ta Mo Chang, Peking.

The Chinese Commercial Association, Shanghai, promoted by the president of the Shanghai Chamber of Commerce and directors of other Chambers of Commerce with a view to developing China's commerce, has completed its organisation.

Both the Shanghai Electric Construction Co., Ltd., which operates trams in the International Settlement and the company which runs trams in the French concession, raised their fares in April last on account of the depreciation of the copper coinage.

The Shansi authorities have recently drawn up a plan for the establishment of generating plants in Taiyuan and 14 other districts. The Taiyuan plant is to have an initial capacity of 1,500 kVA in one unit and will cost $560,000 (including the provision of $100,000 working capital). The other stations will each have an initial installation of one 500-kVA generator and the necessary auxiliaries and will cost $210,000 ($50,000 working capital). Thus the total initial outlay will be $2 940,000.

A company composed of local business men has inaugurated a generating plant at Ichowfu, Shantung province.

A small hydro-electric plant has been started up at Luchow and another site 55 li from Chengtu has been studied for the erection of a similar station.

The Wuchang Electric Light Co. is issuing capital stock to the extent of $1,150,000. The proceeds will be devoted to the purchase of new machinery and equipment.

The Shanghai Mutual Telephone Co., Ltd., which operates in the International Settlement and the French Concession, has raised its capital to Tls. 2,500,000, new shares to the value of Tls. 500,000 having been allotted to the existing shareholders.

The South Manchurian Railway Co. has instituted a tram service between Shahochen, China, and Hsin Wiju, Korea.

A number of additional telephone services are being established in the Kongmoon district.

It has been decided to install a long-distance telephone service between Ningpo and Hangchow. The wires are to be strung on existing telegraph poles.

The Chinese Electric Power Co., Ltd., which operates tramways in the part of Shanghai under Chinese administration, has decided to erect two car depôts. Tenders for the steelwork, &c., have been invited.

The Tientsin radio station, owned by the Tientsin Telephone Administration, was put into operation in April. The station works on a wavelength of 1,000 metres, and a charge of 0.5 fr. per word is made for all messages.

Calendar.—BROOKHIRST SWITCHGEAR, LTD., has sent us calendar cards for July, August and September, each of which bears an interesting pencil drawing of old Chester.

New Municipal Showrooms.—The Chester Corporation's new electrical showrooms were officially opened by the Mayor on July 1st.

Boiler Contracts.—The Vickers-Spearing Boiler Co., Ltd., has recently received contracts from the Bloemfontein Municipal Electricity Department, the Calcutta Electric Supply Corporation, Ltd., and the Bristol Municipal Electricity Department. The last contract is for the complete equipment of the boiler-house extensions, including buildings, two boilers, mechanical stokers, economisers, pipe work, &c.

Italo-American Agreement.—The *Electrical World* reports that the General Electric Co. (America) has concluded an agreement with the Società Italiana Pirelli, of Milan, for working in the United States the Italian company's patents relating to paper-insulated cables, joints and fittings, together with the use of manufacturing and research information with regard to this type of cable.

Uruguayan Tariff Reduction.—Electrically-driven pumps which have been subject to a duty of 31 per cent. of the official valuation, plus surtaxes when imported into Uruguay, are now classed as "industrial machinery" and are accordingly subject only to a duty of 5 per cent., plus surtaxes.

Electricity Supply Commercial Association.—From Saturday, July 4th, the address of the Association will be "Beaulieu," Bean Road, Bexley Heath.

Lighting and Power Notes.

Aylesbury.—ELECTRICITY SUPPLY.—The Town Council has received a Special Order for extending its area of supply in certain parts of the counties of Buckinghamshire, Hertfordshire, and Oxfordshire. A loan of £3,000 has been applied for to meet the costs of a converter and switchgear at the works of Hazell, Watson & Viney.

Barking Town.—ELECTRICITY SUPPLY.—At a recent meeting of the Electricity Committee it was reported that the Electricity Commissioners were in favour of a bulk supply being obtained from the cheapest source, and it was decided to obtain quotations from the County of London Electric Supply Co., Ltd., and the West Ham Corporation. The Committee also decided in favour of the principle of using the land at the rear of the existing station for electricity purposes, and asked the engineer to prepare specifications and invite tenders for the necessary transformer plant and prepare plans for the buildings required.

The annual report of the electricity undertaking for the year ended March 31st last shows that the net profit was £2,660, as compared with £5,758 for the previous year, the reduction being due to reduced electricity charges.

Bedford.—ELECTRIC COOKERS.—The Electricity Committee has recommended to the Town Council that 50 electric cookers be purchased at a cost of £700, to be let out on hire.

Bingley.—NEW SUB-STATION.—The new sub-station which is now almost completed will be formally inaugurated by Mr. T. Snowden, chairman of the Lighting and Tramways Committee, on July 2nd. The station has been erected in connection with the supply for Keighley Corporation and will be capable of carrying three times the load of the old station.

Croydon.—LOANS SANCTIONED.—The Electricity Committee has received sanction to borrow £1,060 for laying a h.p. feeder main, and £2,000 for the installation of electrical plant at Beddington sewage farm.

Dover.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer, Mr. H. D. Munro), for the year ended March 31st last record a total revenue of £52,817, as compared with £49,914 in 1923-24. Working expenses amounted to £28,415, as against £19,542, leaving a gross profit of £24,402 (£30,372). After deducting capital charges there was a net surplus of £4,023; this has been dealt with as follows:—Extinction of debit balance from previous year, £674; set aside for depreciation of investments, £2,000; carried forward, £1,349. The capital expenditure during the year amounted to £15,239, and the total expended on the undertaking now stands at £282,321. The electrical energy sold increased from 2,339,394 to 3,233,777 kWh, and the average price per kWh obtained fell from 4.83d. to 3.92d.

Eastbourne.—YEAR'S WORKING.—We have received from Mr. J. K. Brydges, borough electrical engineer, a copy of his report and statement of accounts on the working of the electricity undertaking for the year ended March 31st last. The total revenue amounted to £80,274, and working expenses were £49,554, leaving a gross profit of £30,719. The figures in the preceding year were—revenue, £79,033; working costs £52,639; gross profit, £26,394. After deducting capital charges there was a net surplus of £6,744, as compared with £1,695 in 1923-24. A contribution of £4,000 was made to the borough fund. The capital expenditure, which included £23,483 for mains and services, amounted to £38,120. The sales of electrical energy increased from 4,921,769 to 5,614,602 kWh and the average price per kWh obtained fell from 3.56d. to 3.29d. The maximum supply demanded rose from 3,251 to 3,638 kW. During the year a new 2,500-kW turbo-alternator and boiler were formally inaugurated.

Gateshead.—"ALL-ELECTRIC" HOUSES.—The Corporation has decided to equip a further 138 houses on "all-electric" lines.

Glasgow.—ELECTRICAL DEVELOPMENT.—The Corporation Electricity Committee has reported that during May 151 houses were wired, bringing the total to date to 982 and that 157 applications for the hire of domestic appliances were dealt with, bringing the total to 7,128.

Gloucester.—EXTENSION OF SUPPLY.—At a special meeting on June 24th, the City Council decided to make an application for a Special Order for the extension of its area of electricity supply, adding thereto the rural district of Gloucester. The electrical engineer (Mr. F. H. Carson) explained that the proposal was to lay underground mains generally in the city and in its immediate vicinity, and to supply the outlying districts by means of overhead lines. The cost of the underground lines would be about £15,000, overhead lines about £8,100, and l.p. mains about £20,000, and the total would be approximately £51,600.

India.—DEVELOPMENT IN CENTRAL PROVINCES.—The Nagpur Electric Light and Power Supply Co. has completed the work of extending mains into the city. The B.N. Railway and the G.I.P. Railway Companies have also entered into an agreement for a bulk supply, the latter railway guaranteeing to take a supply of 60,000 kWh per annum. A licence for the supply of electrical energy to the town of Wardha has already been granted and materials for the overhead lines have been ordered and the construction of the power house commenced. Licences for the towns of Hinganghat and Amraoti have been issued and the schemes are making progress. Jubbulpur will also soon have a public supply of electricity; the licence has recently been issued and orders have not yet been placed for materials. There are three coal mines using electrical power at present in the Central Provinces, *viz.*, Mohpani, Ballarpur and Rajura.

Irish Free State.—GRANARD (CO. LONGFORD).—The Urban District Council has sanctioned the installation of plant in the town for generating electricity.

Lexden and Winstree.—ELECTRICITY SUPPLY.—The Rural District Council has appointed a Committee to consider the question of a proposed extension of the electricity supply from Colchester into its area.

London.—HAMMERSMITH.—The Electricity Committee has recommended to the Borough Council that an agreement be entered into with the Barnes Urban District Council to furnish a bulk supply of electricity in the Barnes area, upon terms and conditions to be approved by the Committee.

ST. MARYLEBONE.—The Electricity Committee proposes to provide transformer stations at Morley House and Marcol House, Regent Street, and the Langham Hotel, Portland Place, at an estimated cost of £13,535, and has recommended that application be made for sanction to the borrowing of this sum for the purpose.

The Education Committee has obtained sanction to loans of £2,869 for switchgear, &c., in connection with the supply of electricity to the L. & N.E.R. premises in the borough, and of £13,112 for cables and switchgear in connection with the bulk supply of electricity from the Central Electric Supply Co., Ltd.

HACKNEY.—The conversion of 208 street lamps from gas to electricity in the Clapton Park district having been successfully carried out, the Finance Committee has recommended that the scheme proposed by the Electricity Committee for the conversion of the remainder of the street lamps in the borough from gas to electricity be proceeded with.

FULHAM.—In view of the additional plant recently installed at the electricity works, the undertaking has been raised from class D to class F, with corresponding increases in the salaries of the technical staff.

The Electricity and Lighting Committee has recommended that the Granville sub-station be refitted with new apparatus at a cost of £1,280.

ELECTRICITY SUPPLY BILLS.—The Special Committee on London Electricity Supply has reported to the L.C.C. that consideration has been given to the question of procedure to be followed in the event of the passing into law of the London Electricity Supply Bills, and the approval of the London and Home Counties Electricity District Order, as regards the fixing of the standard prices for the various companies by the Council, and states that in this connection it will be necessary to ascertain the value of the existing assets of the companies. Owing to the urgency of the matter, the Committee states that it is desirable that preliminary work should be put in hand without delay, and has recommended that the services of Mr. W. Cash, F.C.A., who assisted in drawing up the sliding scale, and Mr. J. H. Rider, who was engaged in connection with the drawing up of the technical scheme, be secured. The Committee has also recommended that a supplemental maintenance estimate of £1,500 be approved to cover expenditure.

Northern Ireland.—LUCAN.—Since the closing down in January last of the Dublin and Lucan Electric Railway, electrical energy has been supplied, as before, to about 80 private houses, churches, hotels and institutions along the line of route. The service, however, has been carried on at a loss and it is now to be terminated.

ARMAGH.—Mr. J. McClinaghan, Lisbien, having withdrawn his offer to light the city by electricity, a proposal has been made that the City Council should promote a scheme of its own.

Palestine.—RUTENBERG SCHEME.—According to *The Times*, the Haifa electric power station—the second stage of the Rutenberg scheme—was opened on June 24th by Sir Herbert Samuel, the retiring High Commissioner for Palestine. The station is larger than the similar one at Jaffa, and the engines have all been bought from British firms. The attitude of the local Arabs is doubtful, but the Arab quarter of the town is being lighted for 15 days "on approval."

Plymouth.—PROPOSED WATER-POWER SCHEME.—The Dartworthy Sanatorium Committee has requested the Water Committee to instruct the water engineer to gauge the flow of the River Avon by the sanatorium lands and, if satisfactory, to obtain a report from a firm of engineers as to the possibility and cost of installing a plant for generating electricity by water power.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

HUDDERSFIELD.—Three-phase supply: From 25 per cent., to 12½ per cent., above the pre-war charge; minimum net price per kWh on scale reduced from .65d. to .6d.; tramway supply, .1d. per kWh; lighting, from 4½d. to 4d. per kWh.

ACCRINGTON.—Heating and domestic purposes: From 1½d. to 1d. per kWh. Rateable value system: The "unit" charge from 1½d. to 1d. The discount of 5 per cent., for prompt payment of accounts is increased to 10 per cent.

YORK.—Lighting: From 5½d. to 4½d. per kWh. Power: A reduction of approximately 10 per cent.

SWINTON AND PENDLEBURY.—Electricity for all purposes to be reduced from 50 to 33⅓ per cent. above the pre-war rate.

WEST HAM.—Lighting: 4½d. per kWh; in factories to the extent of 10 per cent. for quarterly accounts and 15 per cent. for monthly accounts, of consumption for power, 3½d. per kWh. Power: First 40 kWh per h.p. installed per quarter, 3½d. per kWh; all energy in excess 1½d. per kWh. Heating and cooking: 1½d. per kWh. Arc lamps: 4½d. per kWh. All accounts subject to a discount of 5 per cent., for prompt payment.

Rawtenstall.—ELECTRICITY CHARGES.—At a recent conference between the Rawtenstall and Bacup Corporations, the following scale of charges to the Bacup Corporation were adopted as from July 1st next to June 30th 1926:—First 10,000 kWh per month, .9d. per kWh; next 10,000 kWh, .85d.; next 30,000 kWh, .8d.; next 50,000 kWh, .75d.; all additional energy, .7d. The following scale of charges to consumers in both boroughs has been adopted as from July 1st next:—Lighting: First 100 kWh per quarter, 6d. per kWh; all energy in excess, 5½d. per kWh. Power: Small consumers, varying from 2½d. to 1d. per kWh, according to quantity consumed; large consumers, varying from .9d. to .75d. per kWh, according to amount consumed.

ELECTRICITY EXTENSIONS.—In view of the increasing demand for electricity, the Corporation Electricity Committee is considering the advisability of extending the electricity works at Hareholme, and has instructed the electrical engineer to prepare a scheme, with an estimate of the expenditure involved.

Salford.—INAUGURATION OF NEW POWER STATION.—The Corporation's new power station at Agecroft is nearing completion, and will be formally inaugurated by the Mayor on September 23rd. Provision has been made for the accommodation of plant with a capacity of 50,000 kW, comprising four sets of 12,500 kW each, and the water-circulating system and coal-handling plant will be capable of dealing with a capacity of twice this amount. The station has been designed by Mr. J. A. Robertson, consulting engineer, of Manchester, and has been constructed under his supervision. The cost of the station, when completed, will be £710,000.

Skipton.—YEAR'S WORKING.—At the June meeting of the Urban District Council it was reported that the first year's working of the electricity undertaking, which ended on March 31st last, resulted in a loss of £627. It was stated that overhead charges had increased the initial charge of 1d. per kWh to 7d., and that the average loss per kWh was 1d. The extension of the use of electricity for street lighting was urged. With regard to recent breakdowns, it was reported that they were all on the Keighley portion of the supply line and the Yorkshire Electric Power Co., in response to the Council's complaint stated that the breakdowns were due to faults on the Keighley Corporation mains.

Southend-on-Sea.—LOAN.—The Town Council is applying for sanction to a loan of £20,000 for feeder and distributing mains.

South-East Lancashire Electricity Board.—The Board has had under consideration data supplied by the Councils of Billinge, Orrell and Upholland, and the results of investigations by the Lancashire Electric Power Co. and the Wigan Corporation, and has come to the conclusion that the demand for electricity in the areas in question is not such as to indicate a reasonable prospect of the supply being remunerative. The Board has expressed its willingness to support the development by the Wigan Corporation of the portions of Orrell in the neighbourhood of the Wigan boundary, under the Fringe Order procedure.

Special Orders.—The Minister of Transport has confirmed an Order made by the Electricity Commissioners for the supply of electricity by Leeds Corporation in the township of Alwoodley and part of the township of Adel-cum-Eccup. The Commissioners have submitted to the Ministry for confirmation an Order for the supply of electricity by the Somerset Electric Supply Co., Ltd., in the city of Wells, the borough of Glastonbury, and a number of urban and rural districts in the County of Somerset.

Stoke-on-Trent.—"ALL-ELECTRIC" HOUSES.—The Corporation Housing Committee has voted a subsidy of £100 per house in respect of four "all-electric" houses to be erected by the Electricity Committee.

Wortley.—ELECTRICITY FOR HOUSING SITE.—The local Council has requested Sheffield Corporation to extend its cables to the Council's new housing site at Mortomley.

Tramway and Railway Notes.

Barking Town.—YEAR'S WORKING.—The Urban District Council reports a loss of £8,232 on the tramways for the year, compared with a loss of £6,139 in the previous year.

Birmingham.—NEW CARS.—At a recent meeting of the City Council, a recommendation of the Tramways Committee to borrow £66 000 for the purchase of 30 new tram-cars was approved. It was stated that the contract for the supply of the electrical equipment of these new cars had been secured by a Birmingham firm, but that the Corporation had neither the accommodation nor the plant to build the bodies.

Bury.—THROUGH-RUNNING.—According to the *Electric Railway and Tramway Journal*, the provision of a through service of tramcars between the town and Manchester has been considered by the Tramways Committee, which has instructed the town clerk and tramway manager to enter into preliminary negotiations with the Salford Corporation Tramway Department with regard to the introduction of a service between Bury and Deansgate. If the negotiations are successful, and a scheme is adopted, the necessity for changing cars at Whitefield will be removed. The through service of tramcars between Bury and Rochdale will be resumed on Monday, July 13th. This will restore the pre-war service.

Continental.—BELGIUM.—The Commercial Secretary of the Department of Overseas Trade at Brussels reports that the Société des Tramways Electriques du Pays de Charleroi is about to make the following extensions to its tramway system:—The Montigny-sur-Sambre-Charleroi line to be extended to La Neuville; the Charleroi-Couillet line to be extended to Chatelet; the Charleroi-Gilly line to be extended to Vieux-Campinaire.

Croydon.—MOTOR-'BUSES.—The Town Council has decided to accept the offer of the L.G.O. Co. to enter into negotiations for a service of motor-'buses in Addiscombe Road before coming to a decision upon the question of relaying the present tramway track or running railless cars in the Addiscombe district.

Iraq.—BAGHDAD.—Mr. Stanley, representing the Baghdad Tramways & Electric Lighting Syndicate, Ltd., is negotiating with the Government for the modification of the electric tramway concession for Baghdad, which was granted before the war to Mahmood Shabandar, and subsequently bought for about £40,000. It is thought that an agreement is improbable, and that Mr. Stanley will resort to arbitration in accordance with the provisions of the Lausanne Treaty respecting pre-war concessions.

Light Railways.—EXTENSION OF TIME.—The Minister of Transport has sanctioned the extension of time for the completion of light railways under the West Manchester Light Railways Order, 1906, and the Stretford Light Railways Order, 1906, to June 15th, 1926.

Northern Ireland.—BELFAST.—The annual report and statement of accounts of the Corporation tramway undertaking (general manager, Mr. S. Carlisle), for the year ended March 31st last, shows a total income of £603,818, as compared with £594,855 in 1923-24. Working expenses amounted to £390,383 as against £404,856, and expenditure on Bellevue recreation ground charged to revenue account amounted to £5,752, making a total of £396,135. The gross profit was therefore £207,683, and after deducting capital charges there was a balance of £126,962, which was carried forward to appropriation account. This was dealt with as follows:—Redemption contributions, £46,891; annual payment to depreciation or renewals fund, £25,000; surplus carried forward £55,071. The surplus brought forward from the previous year was £31,651. The capital expenditure during the year was £215,343 the chief item being £167,335 on permanent way reconstruction. The number of car miles run increased from 6,857,046 to 7,451,549, and the passengers carried from 94,237,313 to 101,476,902. The revenue per car mile fell from 20.82d. to 19.45d. During the year the system was extended from Woodvale Road to Glencairn Road and the overhead work in connection with the Dundonald and Chichester street extensions was completed. Reconstruction of permanent way was carried out on several routes, the total being about 10¼ miles.

Sheffield.—YEAR'S WORKING.—The report and statement of accounts of the Corporation tramway undertaking (general manager, Mr. A. R. Fearnley), for the year ended March 31st, shows a total income of £878,383, as compared with £845,447 in 1923-24. Working expenses amounted to £633 887, as against £617,845, leaving a gross surplus of £244,496 (£227,602). Capital charges absorbed £125,068, and there was a net profit of £119,427, as compared with £106,229 in the preceding year. The sum of £89,902 was expended on permanent way repairs and renewals during the year. Extensions and doubling of track were carried out in various parts of the city, and 25 double-deck tramcars of improved design were put into service. The rolling stock now consists of 392 tramcars, 64 motor-omnibuses, and 27 miscellaneous vehicles.

Thornaby.—TRAMWAY IMPROVEMENTS.—With a view to relieving local unemployment next winter, the Council has under consideration a scheme for doubling the tramway track in Middlesbrough Road.

United States.—PETROL-ELECTRIC 'BUSES.—Albany, N.Y., is the third city in America to adopt petrol-electric 'buses, Philadelphia and Atlanta having already begun to use this kind of equipment. The Albany vehicles were selected after the trial use of one 'bus since March 1st, so that both winter and summer transportation problems have been encountered. Trolley and petrol 'buses have been previously used by the operating company the Capitol District Transportation Co., a subsidiary of the United Traction Co. The new type of drive, introduced last autumn, consists of a petrol engine, connected direct to an electric generator that, in turn, drives two electric motors which, through worm gears, in special Timken housing, with full floating axles, transmit the power to the road wheels. The nineteen Fageol 'buses will be equipped with Hall-Scott six-cylinder engines and American General Electric generators and motors. The advantages claimed for the petrol-electric drive include greater comfort for passengers, more rapid acceleration without jerking, higher schedule speeds, elimination of skidding, and reduction of maintenance costs.

Telegraph and Telephone Notes.

Italy.—TELEPHONE CONCESSION.—The company which is to handle the telephone concession in the South of Italy that has been obtained by, among others, the Swedish L. M. Ericsson Co., is to have a capital of 50,000,000 lire, of which 27,500,000 lire, or 55 per cent. is said to have been paid, while the remainder will be called for as required. The majority of the capital, in accordance with the terms of the concession, will be held by Italians. The activity of the company was to begin on July 1st, when the network was to have been taken over from the State.

Radio at Sea.—NEW SHIPS' OUTFITS.—The s.s. *Chitral*, of the P. & O. Steam Navigation Co., has been equipped by the Radio Communication Co., Ltd., with a main installation comprising a 1½-kW spark transmitter with a daylight range of 800 miles and a c/w transmitter with a daylight range of 1,500 miles, while an emergency spark set, worked from a battery of accumulators, is provided for use in case of possible breakdown. A direction finder is also fitted and the new Board of Trade regulations in respect of radio equipment for lifeboats have been complied with by the provision of a ¼-kW set.

The Cork Harbour Commissioners have ordered from the Marconi International Marine Communication Co. Ltd., an installation for their pilot boat. The equipment will consist of a standard quenched-spark transmitter and a five-valve directional receiver which can be used with the boat's main aerial for "all-round" reception, or by means of a switch a frame aerial is brought into use in conjunction with the main aerial, and the receiver can be used for direction-finding. The transmitter has a minimum range of 80 miles.

MISSION SHIP'S OUTFIT.—The s.s. *Strathcona II*, belonging to the Royal National Mission to Deep Sea Fishermen, has been equipped with Marconi apparatus; she is the only ship belonging to the Mission to be fitted with a transmitter, though other ships carry receivers. The vessel will undertake the duties of tender to the hospital stations on the shores of Newfoundland and Labrador. The transmitter is the standard Marconi ¼-kW quenched-spark installation, and the receiver has been specially constructed to receive on all wavelengths up to 26,000 metres, thus covering all transmissions of meteorological bulletins, time signals, &c., which will be of especial value to the fishing fleets. Only one valve is employed in the receiver and inductive coupling is used, which makes the tuning very selective.

The Telephone Service.—PUBLIC KIOSKS.—The new type of telephone kiosk designed by Sir Giles Gilbert Scott will shortly be put up in the large towns by the Post Office. They will be a yard square inside, with large windows of 18 panes on three sides, and have improved ventilation. The number of road kiosks in England increased from 931 at the beginning of the year to 1,129 at the end of April, and the rate of progress is being maintained. London's kiosks have increased from 52 to more than 120 this year, and 45 more are being built. Negotiations are in progress with 100 provincial towns for the building of street telephone boxes, says the *Daily Mail*. More kiosks are to be erected in the residential suburbs of Greater London, where, on early closing days, considerable difficulty is often experienced in obtaining access to a telephone call box. The advantage of the kiosk is that it is open day and night throughout the week, including Sunday.

ANGLO-DUTCH SERVICE.—The Postmaster-General announces that the facilities for telephonic communication between Great Britain and Holland have recently been considerably increased. Additional circuits are now working, and communication between this country and Amsterdam, Rotterdam, The Hague, and the principal towns in Holland can be obtained (with the exception of the period between eleven and twelve noon) practically without delay.

Radio Notes.

Aerials. — HEIGHT RESTRICTION. — The Coulsdon Town Council recommends that radio receiving aerial poles on housing estates should not be allowed to exceed 25 ft. in height.

Germany.—RHINELAND PROHIBITION RELAXED.—The Rhineland Commission is considering the possibility of rescinding to some extent the prohibition of broadcasting in the occupied area. The use of wireless apparatus is to be permitted for certain business and educational purposes, says *The Times*, and the final decision regarding permits is to be left to the responsible Army Generals of the respective districts.

Labrador.—RADIO OUTFIT.—The Moravian Mission boat *Harmony*, which recently left the London Docks on her annual visit to Labrador, is taking out a four-valve wireless set which has been specially made for use in the Mission boarding school for Eskimos and the children of settlers at Makkovik. The set is a present from listeners who heard Captain Jackson speak about the mission work in Labrador from 2LO. He hopes that the Makkovik school will be able to get American stations like Schenectady regularly, and be kept in touch with "home" through the news bulletins from Chelmsford.

Meteorological Forecasts.—SHIPS' SERVICE.—On and after July 1st the British Broadcasting Co. will co-operate with the Mercantile Marine Department of the Board of Trade, the Meteorological Department of the Air Ministry, and the Post Office in extending to smaller coastal vessels gale, fog, and other shipping warnings. Since the beginning of last year broadcast warnings to shipping have been sent out by the Air Ministry on a continuous w-t wave (4,100 metres) twice a day, and from June 1st of this year, for the benefit of vessels not fitted to receive the long wave, warnings have been sent on the 600-metre spark from the Cullercoats, Niton, Seaforth and Valentia radio-telegraph stations. It was in order to reach the smaller craft, says *The Times*, that the assistance of the British Broadcasting Co. was invited and immediately accorded. Its high-power station (5XX) will broadcast each morning at 10.50 a.m. (summer time) on a 1,600-metre wave the weather inference specially for shipping from Chelmsford and later on from the new station at Daventry, Northamptonshire. In the evening, between 10.20 and 10.25 p.m. (summer time), the service will be taken up by three local stations—Liverpool for the West Coast, Bournemouth for the South, and Newcastle for the East.

Radio in Hospitals.—ADVISORY COUNCIL FUND.—A meeting of the Advisory Council of the Wireless for Hospitals Fund was held on June 22nd in the board room of the British Broadcasting Co. Lord Knutsford presided. According to *The Times* the resources of the fund in money and material now amount to more than £14,000. A standard specification of hospital equipment drawn up by the technical members of the Council was submitted and approved. A report on the progress made in the equipment of the hospitals already approved was placed before the meeting. These include the London, St. Bartholomew's, and the Royal London Ophthalmic. Application for equipment has been made to the Council by a large number of hospital authorities in London. It was decided as a general principle that the largest hospitals, that is, those containing the greatest number of beds, should be equipped first, and among those approved by the Council are the following:—St. Thomas's, Guy's, Middlesex, St. George's, University College, St. Mary's, Paddington, King's College, Royal Free, Charing Cross, Westminster, Royal Northern, and London Temperance.

Wave-Length.—GENEVA CONFERENCE.—An international conference will be held at Geneva on July 6th and 7th under the auspices of the newly established International Radiophone Bureau, of which Mr. A. R. Burrows is director, to try to secure agreement upon a wave-length system enabling European stations to operate without risk of mutual interference. A memorandum on the subject, including a scheme for future working, was recently drawn up by Capt. Eckersley, chief engineer of the British Broadcasting Co., and will form the basis for discussion. So that there shall be no delay in putting the recommendations of the Conference into operation, it has been timed to precede the Council meetings of the International Radiophone Union, which will meet at Geneva on July 8th and 9th.

Contracts Open and Closed.

(The date given in parentheses at the end of the paragraph indicates the issue of the "Electrical Review" in which the "Official Notice" appeared in our advertisement pages.)

Open.

Australia.—SYDNEY.—September 9th. New South Wales Railway Commissioners. One electric travelling jib crane and maintenance for 12 months. (A.X. 2,120.)*

July 27th. Municipal Council. One 5,000-kVA, 5,000/33,000-V step-up transformer; supply of gasfilled lamps. Specifications from the office of the Construction Engineer, Electricity Department, Town Hall, Sydney.

MELBOURNE.—August 3rd. Electricity Commission of Victoria. Switchgear and accessories.

September 14th. 3,000-kVA transformers and spares. Particulars from the Purchasing Section of the Commission, William Street, Melbourne.

Belgium. — July 15th. Belgian Post and Telegraph authorities at La Salle Madeleine, Brussels. Telephone cable, with accessories, for Waremme, Hannut, Libramont, Bastogne, Saint Vith, and Theux.

July 16th. Municipal authorities of Schaerbeek, Brussels. Three h.p. automatic switches, two 3-phase transformers. Particulars from Service de l'Electricité, Hotel Communal, Place Colignon, Schaerbeek.

Bridgend.—July 31st. Penybont Rural District Council. Kenfig Hill electricity scheme. L.p. underground and overhead mains, transformers, switchgear, meters, and house wiring. (June 26th.)

Cupar (Fife).—July 8th. County Council. Electric lighting installation at new police buildings. Specifications from Mr. C. R. Douglas, surveyor, 15, East Street Dunfermline.

Dundee.—July 17th. Electricity Department. Steam and exhaust pipes. (June 26th.)

(Continued on page 23.)

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The I.M.E.A. Convention.

The New President.

THE election of Mr. R. B. Mitchell, M.I.E.E., engineer and manager of the Glasgow Corporation Electricity Department, to the office of president of the I.M.E.A. for the current year, is a timely recognition of outstanding merit. We naturally—and rightly—associate with the name of Glasgow the idea of sound and sagacious municipal government, a reputation which cannot be maintained without the support of a highly competent permanent staff; and in that respect the electricity undertaking has never fallen below the standard set by the city's traditions.

Photo by [*Ralston.*

Mr. R. B. Mitchell, President of the I.M.E.A.

Mr. R. B. Mitchell was born and bred in Glasgow, and his career has been spent almost wholly in the service of the city. In 1898 he was appointed shift engineer in a battery station; he was promoted to shift work in the Waterloo Street works, when it was a generating station, and later was in charge of a shift at the Port Dundas electricity works, where after three years he was made resident engineer.

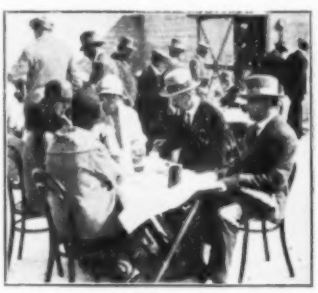
Mr. Mitchell's next move was to the mains department; he was appointed superintendent of mains, and for 12 years had sole charge of the transmission and distribution sides of the undertaking. Thus he acquired an all-round experience which eminently fitted him to become, in 1917, Deputy Chief Engineer and Superintendent of Stations: from that post it was an easy step to the position of Chief Engineer and Manager in 1920. Mr. Mitchell is fortunate in possessing in the highest degree the confidence of the Corporation which he has served so long, and in his personal acquaintance with every aspect of the great undertaking which he controls. He now stands at the head of a department which is in the front rank in respect of its efficiency and good management, and which is well equipped with plant to meet all requirements.

Mr. Mitchell is a member of the Institution of Electrical Engineers, Past Chairman of the Scottish Local Centre of that Institution, a Vice-President of the Institution of Engineers and Shipbuilders in Scotland, and a member of the American Institute of Electrical Engineers. As a member of Council of the Incorporated Municipal Electrical Association he has been assiduous in the performance of his duties, having been present with his chairman, Dr. Dewar, at every one of the 11 meetings held during the past year, and it is certain that as President he will not spare himself, but will, like his predecessors loyally serve the Association to the utmost of his capacity. As one of the youngest heads of departments of the Glasgow municipality, he has, we hope, many years of active work before him, and in his hands neither the Association nor the Corporation need fear that its interests will be neglected or that its prestige will be allowed to fade.

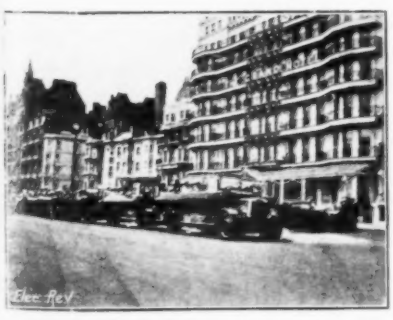
Mrs. Atkinson, with Messrs. W. A. Brown and H. A. Nevill

Mr. C. E. Newton, Ald. Taylor, and Mr. H. F. G. Woods.

The New President and Dr. Ferranti.

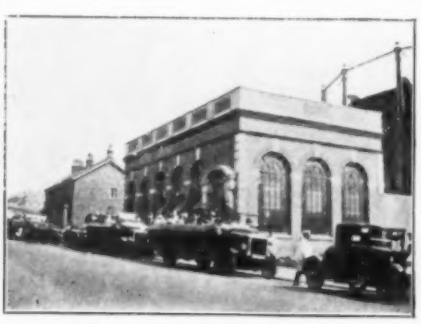


Mr. and Mrs. A. J. Fuller and Mr. and Mrs. A. J. Hedgcock.



Starting from the Grand Hotel for Eastbourne.

The President, Mr. W. C. P. Tapper, having a look round.



At the Kemp Town Sub-station, Brighton.

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The Electric Drive in Carpet Mills.

Messrs. Stewart Brothers' Eskbank Mills.

THE textile industry has ranked for many years as one of the leading industries in this country, and whilst much has been written on most of its branches, it is surprising that so little has been said about the carpet branch.

About 1540 an effort was made to manufacture carpets in this country, but it was not until 1600 that the industry was successfully established, mills being erected at Mortlake, in Surrey. It is interesting to record that, owing to the lack of skilled English labour, weavers had to be brought over from France to carry out the weaving operations.

The carpet industry is a highly specialised one, and for that reason it is of paramount importance that manufacturers should adopt the best machinery and most efficient means of driving it in order to meet the severe competition experienced from foreign countries, and the success of the electric drive as applied to the industry is a sure indication of the many advantages to be derived from it. New mills are being electrified throughout, and many of the older ones that have been converted have effected a considerable saving in cost, both with regard to running expenses and repairs, coupled with the superior convenience, improved quality of the product, safety, and other no less important merits of the electric drive.

Fig. 1.—General View of Carpet-weaving Shed.

An interesting example of the conversion from steam and gas to electric driving is the Eskbank carpet mills of Messrs. Stewart Bros., who produce tapestry and velvet pile classes of carpet by the method Mr. Whytock, of Edinburgh, invented in 1832 of printing the colours on the warp threads. The progressive order of the process is: Scouring the yarn, stoving, steeping in cold water, dyeing, winding on to bobbins, printing, steaming and drying, winding for the setters, setting, beaming, and weaving.

This Midlothian mill was originally driven by a steam engine and one gas engine, the shafting throughout the mill being driven through at least eight sets of bevel gears, which required constant lubrication and attention. The lighting was by gas with incandescent mantles. The boiler plant originally installed was condemned for the pressure for which it was designed, but it could still be used for producing the lower-pressure steam required for process work in the mill. Bearing the fact in mind that it was impossible to install new steam power plant without radical alteration of the mill buildings, it was decided to purchase electricity in bulk from the Lothians Electric Power Co. at 11,000 volts, 50 cycles, 3 phase, and adopt electric driving throughout.

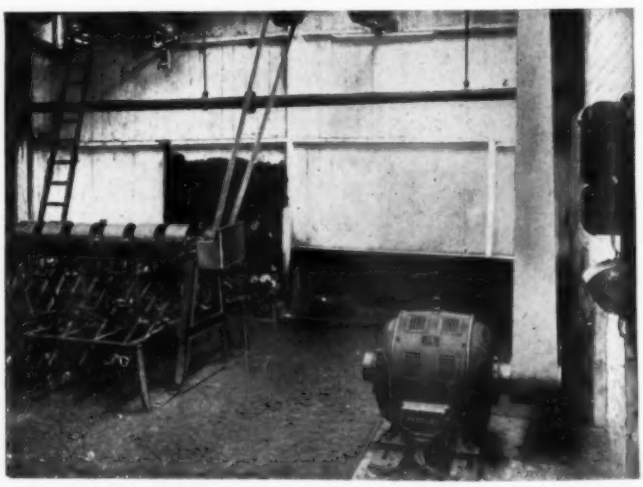

Fig. 3.—Bobbin-winding Frame and Line Shafting driven by 15-b.h.p. Motor.

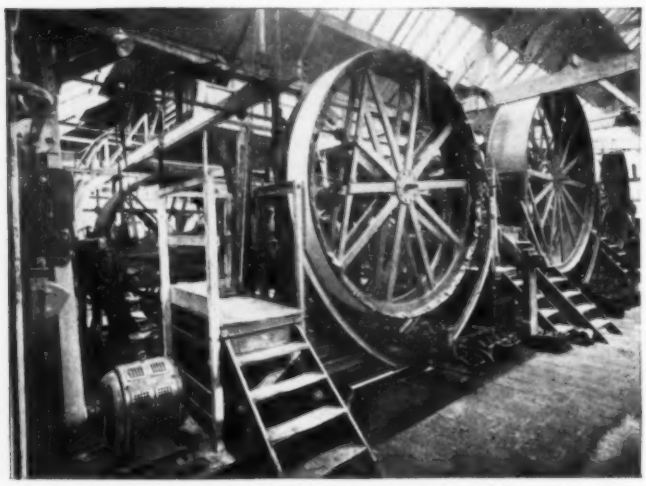

Fig. 2.—Printing Machines driven by 4-b.h.p. Motor.

A transformer house was erected near by, in which a 200-kVA Johnson & Phillips transformer is installed for reducing the voltage from 11,000 to 400 volts. The transformer is of the oil-immersed self-cooled type, and a sheet-steel cubicle has been installed for controlling the h.p. supply; another sheet-steel cubicle contains three kW-hour meters and three Hill-Shotter maximum-demand indicators, both cubicles being of Erskine Heap manufacture.

Operating in parallel on the low-pressure side of the transformer is a 125-kVA oil-immersed static condenser with auto transformer stepping up the l.p. from 400 to 600 volts and controlled by a Ferguson Pailin floor-mounted switch pillar. The object of this piece of apparatus is to improve the power factor of the system and, in order to prevent the condenser from supplying wattless current to the mains of the electricity

supply company when the mill is lightly loaded and thus increasing the maximum demand kVA; it is further controlled by a special automatic circuit breaker with jamming relay made by the Igranic Electric Co., which automatically cuts out the condenser when the load falls below a predetermined figure and inserts it again when the load rises above a certain figure.

The l.p. supply from the transformer is controlled by distribution switches and fuses, there being one set

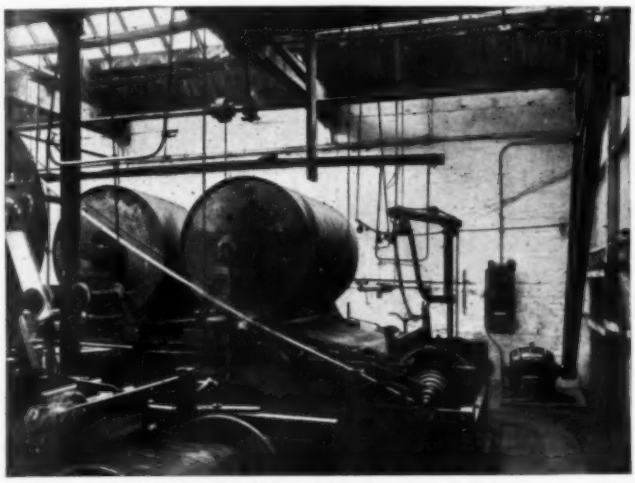

Fig. 4.—Dressing Drums driven by 7½-b.h.p. Motor.

for each department in the mill. From the distribution board, three-core armoured cables are run to sub-distribution boards throughout the mill and from the latter to sub-distribution ironclad fuseboards, whence the circuit wiring in tubing is run to the various motors and control gear.

The motors, which were manufactured by Messrs. Bruce Peebles & Co., Ltd., of Edinburgh, are of the squirrel-cage induction type, fitted with textile enclosing covers, the construction of which is such that any fluff which may gather round the apertures can be easily wiped off. The advantages in favour of this type of motor are its extreme flexibility as regards pressure, steady running, and small speed variation from no load to full load.

Fig. 1 is a general view of one of the weaving sheds, which is driven on the subdivided group system by three 10-b.h.p., 472-r.p.m., Peebles induction motors, while fig. 3 depicts a 15-b.h.p., 475-r.p.m., motor

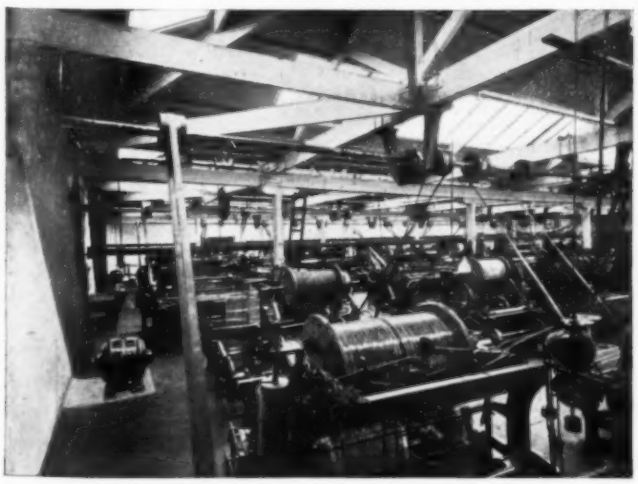

Fig. 5.—Weaving Shed, Group-driven by three 15-b.h.p. Motors.

driving bobbin-winding frames and line shafting; the star-delta starting switch is clearly shown on the wall on the right of the picture. Fig. 2 illustrates the printing machines, driven by a 4-b.h.p., 567-r.p.m. motor, which are of particular interest.

An examination of the illustration will show that the construction of these printing machines is very simple, each merely consisting of a large lightly-constructed drum, a part of the periphery of which is collapsible to allow of the yarn being removed after printing, and a movable wheeled dye-trough situated underneath the drum. On the operators' platform a printers' board will be seen suspended by a cord, the respective colourings of the warp threads being indicated on this board by suitable colour signs which correspond to the figuring on the edge of the drum.

White yarn is run on to the drum of a length corresponding to the length of five or six pieces of carpet, according to the number being run off; the trough is next charged with a dye of the required colour, and the printing process begins. The trough, which is mounted on a small railroad, is fitted with a roller having its periphery formed of vulcanite, and this roller revolves partly in and partly out of the trough, somewhat after the fashion of a lawn marker. The trough is set in motion, moving in the direction of the axis of the drum, and in doing so the roller leaves an impression on the warp threads of a width corresponding to the width of one elongated stitch; the drum is then moved

Fig. 6.—Three 10-b.h.p. Motors driving Weaving Shed shown in Fig. 1.

round to a position indicated by the printers' board, and the process repeated. When a change of colour is required it is only necessary to replace one trough by another, a number of which are allocated to each machine. When the run of yarn has been completely printed in the required colours, it is removed and forms one thread of the warp of five or six pieces of carpet according to the length. Fresh white yarn is now run on and dyed, thus forming the second thread of the warp.

After leaving the printing machines the warp threads are steamed and dried, this process ensuring that the dyes fully enter the pores of the yarn; fig. 4 shows the dressing drums, which are driven by a 7½-b.h.p., 472-r.p.m. motor. The warp threads are next placed on setting frames, the various threads being arranged in relation to one another according to the design; when this is being done, the pattern may be seen taking form. The warp being now set, it is wound on beams or rollers and is ready for the weavers. Fig. 5 depicts one of the

weaving sheds, driven by three 15-b.h.p. motors, whilst fig. 6 shows three 10-b.h.p. motors driving the weaving shed shown in fig. 1.

Illustrations 7 and 8 are two views of the drying drums and brushing machine, driven by a 10-b.h.p. motor, used for cleaning and drying the surface of the carpets. All the motors are sufficiently protected by substantial metal guards which, having been removed so as not to obscure the photographs, are not shown in the illustrations.

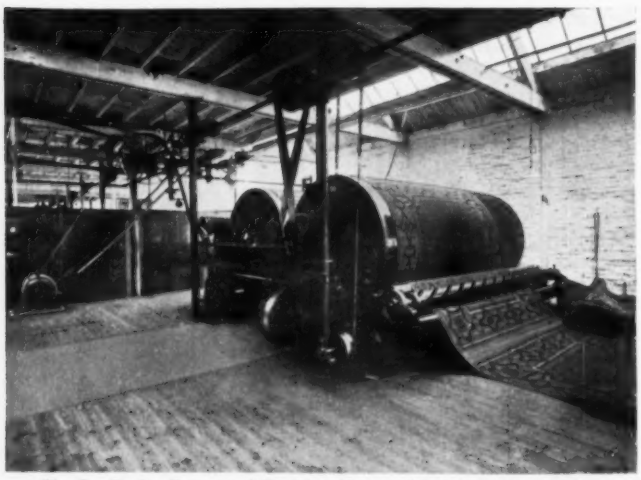

Fig. 7.—Drying Drums and Brushing Machine driven by 10-b.h.p. Motor.

The arrangement of group driving throughout the mill was adopted to avoid alteration to existing driving arrangements, and it is interesting to note that the change-over to electricity was effected without any reduction in the working time of the mill. To enable this to be done, the whole electrical equipment was installed before the steam and gas power was cut off and, group by group, the change-over was effected during meal hours and one or two evenings, it being only necessary in many instances to remove the bevel pinions.

The lighting of the mill, of course, is by electricity; supply is obtained from the neutral point and each of the phases of the low-pressure side of the transformer, the voltage obtained between the neutral point and any one of the phases being 230 V. The lighting load is divided as equally as possible between the three phases, and the three lighting boards control the circuits to sub-distribution boards throughout the mill, and they are connected by twin armoured cables. The connections from the sub-distribution boards to the lighting switches are run in tubing. The lighting is worthy of note in that an effort has been made to illuminate individually each process and to provide uniform light throughout in so far as it is possible to do so in such mills. At a recent social gathering the chairman of the Workers' Committee expressed his view to the management that nothing so beneficial in the history of the company had been done for the workers to compare with the new lighting.

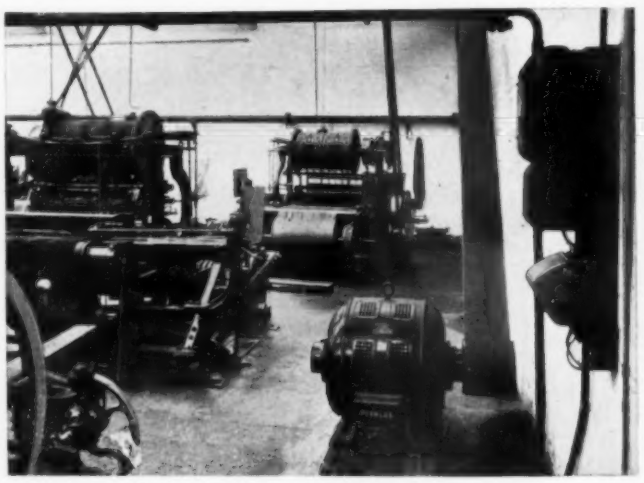

Fig. 9.—A 15-b.h.p. Motor driving Carpet Looms.

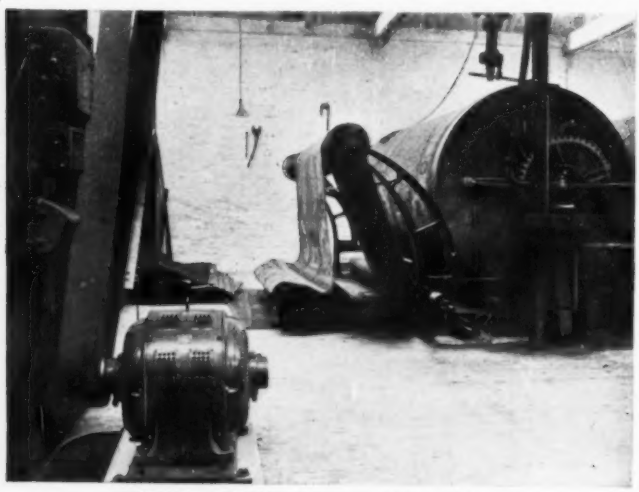

Fig. 8.—Drying Drum, showing 10-b.h.p. Motor. (Note Starting Switches on Wall.)

Summarising briefly the various advantages resulting from the electrification of a carpet mill, it may be said that any portion of the mill not in use may be shut down without interfering with the rest of the plant, thereby effecting a considerable saving in power, which would otherwise be wasted in running idle line shafting. Moreover, a mechanical or electrical breakdown would be entirely confined to its own section, all other sections proceeding as usual while repairs were being carried out. Individual sections of the mill can be run on overtime without that waste of power which is brought about by running the whole mill for the sake of a few machines, while power costs may be checked at any desired moment.

The introduction of machinery into the carpet-making industry, and the increased production consequent thereon, has had the effect of considerably reducing the cost of carpets, thus bringing them within the means of everyone. Many mills are still driven by antiquated steam engines, although the cost of converting a mill to electric driving is more than compensated for by the saving in running expenses and other advantages which accrue from electrical operation. In view of what the use of electricity has done in other branches of the textile industry, carpet manufacturers should have no difficulty in appreciating its merits as the most efficient means of driving factory machinery. When considered in conjunction with the more healthy, clean, and less noisy conditions under which the employés are enabled to work, the day would seem to be not far distant when those facts will be generally recognised, not only in all branches of the textile trade, but in every industry that makes use of power-driven machinery.

In conclusion, it should be mentioned that the complete electrical installation described above was carried out by the agents of Messrs. Bruce Peebles & Co., Ltd., Messrs. Mitchell, Graham & Son, Ltd., of Edinburgh, who were responsible for the execution of the whole of the work.

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Contracts Open and Closed

(*Continued from page 18.*)

Open.

Colchester.—July 10th. Education Committee. Installation of electric lighting at St. John's Green Council school. Specification from the Borough Electrical Engineer (Mr. Wm. Frisby).

Edinburgh.—July 9th. Education Authority. Electric lighting installation at three schools. Schedules from the Executive Officer, Education Offices.

July 13th. Electricity Department. Installation of electric lighting at the public wash-house, Abbeymount, Edinburgh. Specifications from Engineer, Dewar Place.

Egypt.—CAIRO.—July 9th. Director of the Section of Local Municipalities and Commissions (Savoy House), Cairo. Supply and installation of an electrical system at Zifta.

Inspecting Engineer in London. 3,000 metres submarine cable, underground cables, 10 tons line wire, bolts and nuts, &c.—*Reuter's Trade Service* (Cairo).

Fife.—July 6th. Education Authority. Electric lighting work in connection with the addition to Leslie Public School. Schedules from Master of Works, Fife Education Authority, Kirkcaldy.

Grimsby.—July 4th. Electricity Department. 15,000 yd. p.i.l.c. l.p. cables. (June 19th.)

Hemsworth.—July 6th. West Riding Education Committee. Electric lighting at Council School. Specifications, &c., from Education Department, County Hall, Wakefield.

India.—SIMLA.—July 20th. Indian Stores Department. Diesel-engine alternator sets, water-cooling units, oil fuel storage tank oil-purifier equipment, 10-ton overhead crane, switchboard, cables, transformers, e.h.p. feeder cables, &c.*

Littleborough.—July 8th. Urban District Council. 6,600-V cables, roadwork, &c., transformer, switchgear, and cable connections for new sub-station. (June 19th.)

London.—H.M. OFFICE OF WORKS.—July 9th. One 110-V, 3,500-Ah secondary battery for the National Physical Laboratory, Teddington. (June 26th.)

BATTERSEA.—July 21st. Electricity Department. One 10,000-kW turbo-alternator, with condensing plant, switchgear, and two 65,000-lb. per hour boilers, with pipework and ash-handling plant. (June 19th.)

STEPNEY.—July 8th. Board of Guardians. Electrical fittings for two months. Forms of tender from Mr. F. J. Tootell, Guardians' Offices, 74, Vallance Road, Whitechapel, E.1.

LEWISHAM.—July 6th. Board of Guardians. Installation of electric clocks at the Hospital, High Street, Lewisham, S.E. (June 26th.)

Loughborough.—July 9th. Poor Law Institution. Installation of electric lighting at the Institution. Plans and specifications from Mr. E. G. Phillips, consulting engineer, Queen's Chambers, King Street, Nottingham.

Lymm.—July 13th. Urban District Council. Electrically-driven centrifugal pump. Particulars from Mr. N. Holt, clerk to the Council, Council Offices.

Manchester.—July 9th. Board of Guardians. Electrical equipment, comprising rotary converters, transformers, and control panels at Booth Hall Infirmary, Charlestown Road, Blackley. Particulars from Mr. E. Hargreaves, superintendent of works, Union Offices, All Saints, Manchester.

July 16th. Electrically-driven booster pumping plant at Booth Hall Infirmary. Particulars from Mr. E. Hargreaves, Union Offices.

July 20th. Electricity Department. Electric cooking ranges and switches and cut-outs for 12 months. (See this issue.)

New Zealand.—WELLINGTON.—July 21st. Public Works Department. Two electrically-operated water-level indicators.*

August 18th. Posts and Telegraph Department. Switchboard plugs.*

INVERCARGILL.—Electricity Department. 2,200 ft. .1 sq. in. 11,000-V cable; 80 ft. .3 sq. in. 3,300-V cable and spares.*

August 17th. Four 667-kVA single-phase transformers.*

Skipton.—July 10th. Electricity Department. L.p. cable. (June 26th.)

Stoke-on-Trent.—July 7th. Electricity Supply Department. Two 25-kVA transformers and electrically-driven grab crane. (June 19th.)

Switzerland.—July 11th. Swiss Federal Railway authorities, Berne. Installation at the Vernayaz hydro-electric station of two 250-kVA single-phase transformers and two of 75-kW capacity. Particulars for 10 fr. from Abteilung für Elektrification, Dienstgebaude, Zimmer 164, 43, Mittelstrasse, Berne.

Tunbridge Wells.—July 8th. Electricity Committee. One 3,000-kW turbo-alternator, with condenser, piping, and cables, one cooling tower, steam piping, &c. (June 5th.)

Uruguay.—MONTEVIDEO.—July 28th. State Electricity Supply Works. 15 equipments (switchboard, feeder cubicle, &c.) for transformer sub-stations.*

West Ham.—July 20th. Education Committee. Wiring of eight schools. (June 26th.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Closed.

Australia.—SYDNEY.—City Council. Electricity Committee.

Split-conductor feeder panels (£2,236); h.p. switch panels for 5,000-V and 10,000-V sub-stations (£10,745).—Ferguson, Pailin, Ltd.

Rubber insulated cables.—Nine tenders were received, all quoting the same price (£2,400). The Committee recommended the Council to eliminate from the list the names of the Australian General Electric Co. Ltd., and the British General Electric Co., Ltd., and that the general manager be authorised to accept the most suitable tender from the remaining offers.

50-ton electrically-operated travelling crane.—Andrew Thompson and Scougall.

L.p. oil-switch transformer panels (£3,738).—Metropolitan-Vickers Electrical Co., Ltd. —*TENDERS.*

Belgium.—Five Belgian and one British concern (the British Insulated & Helsby Cables, Ltd., Prescot) submitted tenders last week to the Société Nationale des Chemins de Fer Vicinaux, Brussels, for the supply and laying of a quantity of underground h.p. cable. The quotations ranged from 316,372 to 400,258 francs, the lowest being that of the Société des Cableries et Corderies du Hainaut, of Dour.

Bournemouth.—Tramways Committee. Accepted:—

Generating and condensing plant (£11,248).—W. H. Allen & Co., Ltd.
Supply and erection of cooling tower (£3,260).—Premier Cooler and Engineering Co.
Two water-tube boilers (£8,680).—Babcock & Wilcox, Ltd.

Brighton.—Lighting Committee. Accepted:—

Cable.—(£2,621), Siemens Bros. & Co., Ltd.; (£269), W. T. Henley's Telegraph Works Co., Ltd.; (£3,499), Macintosh Cable Co., Ltd.

Tramways Committee. Accepted:—

Three single turnouts (£155, £149 and £162).—Hadfields, Ltd.

Burslem. — Territorial Army Association. Recommended:—

Electric light fittings for the drill hall, &c.—Blackburn, Starling & Co.

Dorchester.—Lighting Committee. Recommended:—

Feeder cable (£721).—Johnson & Phillips, Ltd.
Feeder panel.—General Electric Co., Ltd.

Glasgow.—Health Committee. Recommended:—

Electric lighting work at Mearnskirk Sanatorium (£2,723).—Andrew Hutcheson, Ltd.

Corporation Tramways Committee. Recommended:—

Trolley wire.—R. Johnson & Nephew, Ltd.
Block nuts.—P. & W. MacLellan, Ltd.
L.c. cable.—Western Electric Co., Ltd.
Armature-banding lathe.—Midland Dynamo and Motor Repairs Co., Ltd.
Steel tires.—Steel Co. of Scotland.

Halifax.—Tramways and Electricity Committee. Recommended:—

Tenders in connection with the Halifax-Huddersfield linking-up scheme:—

Switchgear (£3,024).—British Thomson-Houston Co., Ltd.
E.h.p. cable, pilot and telephone cables (jointly with Huddersfield Corporation).—British Insulated & Helsby Cables, Ltd.

London.—LONDON COUNTY COUNCIL.—Accepted:—

4 arc-welding plants (E.L. type) for the Tramways Department.—Equipment and Engineering Co.
Six months' supply of dry cells.—Edison Swan Electric Co., Ltd.

METROPOLITAN ASYLUMS BOARD.

The following tenders were received for installation of electric light at High Wood Hospital for Children:—

Smethurst & Co. (London), Ltd.	£2,589
C. F. Williams	2,920
Coley & Swinnerton, Ltd.	3,000
T. Clarke & Co., Ltd.	3,100
A. Hawkins & Sons	3,100
Read & Partners, Ltd.	3,153
Power Contracts, Ltd.	3,431
W. H. Gaze & Sons, Ltd.	3,511
Griggs & Son	3,625
G. A. Weston	3,995
W. E. Heath & Co.	7,750

GENERAL POST OFFICE. Accepted:—

One special double-output 2-kW generating set, with twin-cylinder vertical gas engine, for the automatic telephone exchange at Oughtibridge, near Sheffield.—Stuart Turner, Ltd.

Manchester.—The Corporation Tramways Committee last week decided to recommend the Council to sanction the acceptance of the tender of the United Steel Products, Ltd., at £4,800 for special track material; the figure, it is stated, is about £200 less than the lowest British tender. According to the *Daily Dispatch*, there was some opposition at the meeting of the Tramways Committee to the contract going outside the country, but there was only a small attendance of members.

Electricity Committee. Accepted :—

Cable.—British Insulated & Helsby Cables, Ltd.; Macintosh Cable Co., Ltd.; F. Smith & Co.; Callender's Cable & Construction Co., Ltd.
Pipes and flanges for soot blowers.—Wellington Tube Works, Ltd.
E.h.p. cables linking the Barton station with supply area.—Callender's Cable & Construction Co., Ltd.

Central Purchasing Committee. Accepted :—

Incandescent electric lamps.—Metro-Vick Supplies, Ltd.; Edison-Swan Electric Co., Ltd.; British Thomson-Houston Co., Ltd.; Siemens and English Electric Lamp Co., Ltd.; British Insulated & Helsby Cables, Ltd.; General Electric Co., Ltd.; Stella Lamp Co., Ltd.

Housing Committee. Accepted :—

Electric light installation at Blockley housing estate.—J. Armstrong and Co., Ltd.

Plymouth.—Electric Committee. Accepted:—

Motor converter and switchgear for Newport Street (£7,450).—General Electric Co., Ltd.

Portsmouth.—Board of Guardians. Accepted :—

Electrical fittings.—General Electric Co., Ltd.

Salford.—Electricity Committee. Accepted :—

Removal of the d.c. lighting and power board at Frederick Road power station, including new rotary panels (£1,870).—Bertram Thomas.
Cable (£2,674).—W. T. Glover & Co., Ltd.

South Africa.—CAPE TOWN.—Electricity Committee. Recommended :—

Six tons copper wire (£525); cable (£157).—Telegraph Mfg. Co., Ltd.
Seven transformers (£1,225).—General Electric Co. of America.
Circulating-water equipment (£126).—Griffin Engineering Co.
Two Ferranti transformers (£150).—Rice & Wiethelm, Ltd.
Cables (£2,040).—W. T. Henley's Telegraph Works Co., Ltd.

Stoke-on-Trent.—Electricity Committee. Accepted :—

Three switchgear panels at Hanley sub-station (£300).—A. Reyrolle and Co., Ltd.

Sunderland.—River Wear Commission. Accepted:—

Two sets of hydraulic pumps, with electric motors, automatic, electric, and hydraulic control gear (£2,042).—Fullerton, Hodgart & Barclays, Ltd.

Forthcoming Event.

Faraday Society.—Monday, July 6th. At Burlington House, W. At 5.15 p.m. Annual general meeting.

Notes.

The United States and Canadian Water Power.—Sir Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, has made a strong protest against the proposed leasing of a water-power site at Carillon on the Ottawa River to American interests. He states that Ontario is faced with the prospect of a severe power shortage and consequently needs every water-power that can be developed. Although it is stated that the potentiality of the Carillon project is only 200,000 h.p., permission is sought for the export of twice this amount of power. Sir Adam states that at present the Canadian people have a safeguard in the matter of exported power; notices are served annually on users of Canadian-produced power, pointing out that the power is only being exported until such times as it is needed in Canada. He avers that the concession seeks to destroy this safeguard.

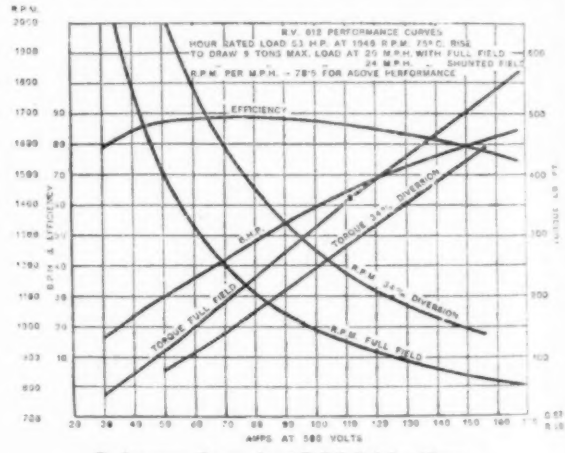
The Aurora Spectrum.—Prof. McLennan recently announced, at the Royal Society, that he had determined the conditions that give rise to the peculiar green line found in the spectrum of the Aurora Borealis. This knowledge may be of the greatest value in elucidating the problem of the transmission of "wireless" waves around the world. Photographs of the spectrum of the Aurora Borealis have been taken by numerous workers, and in the spectra obtained there has always been a green line amongst the bands at a definite point. Lord Rayleigh identified the bands with the spectrum of nitrogen, but the green line remained a puzzle, having never been reproduced in the spectrum of any element, nor in the spectra of compounds of elements in laboratory experiments. The green line was obtained recently at Toronto by the Professor and his co-worker, Dr. Shrum, in the spectrum of oxygen and helium, with the latter in excess. One peculiarity of the green line was that it could be obtained on almost any night from the light of a cloudless sky. Prof. McLennan now shows that the green line spectra ordinate in highly rarefied oxygen, and that the intensity is gradually enhanced when helium is added to the oxygen. The Aurora light comes from a region some 60 or 100 miles above the earth, and the origin of the green line indicates that at this height the atmosphere contains 20 to 30 times as much helium as oxygen.—*Morning Post.*

The Electrical Engineers' Ball.—We are pleased to learn that owing to the success of the Electrical Engineers' Ball, held in February, the Committee has been able to distribute out of the surplus funds the sum of £70 each to the I.E.E. Benevolent Fund and the Electrical Trades Benevolent Fund.

Electric Transmission from Norway to Denmark.—Dealing with this oft discussed problem, Mr. Angelo, manager of the North Jutland Electricity Supply Works, before the annual conference of the Danish Electricity Works Association held in Copenhagen on June 16th, put forward six alternative schemes, each of which would involve an expenditure of about 50,000,000 kronor. One project suggested the construction of two high towers in the Sound for the suspension of the aerial conductors. The transmission by means of submarine cables would result in a lesser outlay, but the author stated that some of the power would thereby be lost. In his opinion the former scheme, although it might be delayed many years, would be carried out eventually. The expenditure should not be borne solely by Denmark, but also shared by Norway and Sweden.

Deterioration of Fibrous Insulating Materials.—We have received details of experiments carried out at the the Institute of Physical and Chemical Research, Tokio, on some fibrous insulating materials in order to determine the effect of temperature on the deterioration of such materials. The rate of deterioration of the insulating materials by heat was measured by the amount of decomposed gases, or by the weight decrease of the material, which is commonly known as the thermal decomposition or carbonisation. Curves plotted from the results of the experiments show that with cotton the weight of material fell to 90 per cent. in 1,250 hr. at 165 deg. C., and to 35 per cent. in 200 hr. at 205 deg. C.; with filter paper to 90 per cent. in 550 hr. at 165 deg. C., and 30 per cent. in 70 hr. at 223 deg. C.; with linen to 90 per cent. in 1,000 hr. at 165 deg. C., and 45 per cent. in 80 hr. at 215 deg. C.; with manila paper to 95 per cent. in 700 hr. at 145 deg. C., and 34 per cent. in 6 hr. at 265 deg. C.; with silk to 97 per cent. in 1,350 hr. at 125 deg. C., and 60 per cent. in 4 hr. at 265 deg. C.; and with empire cloth to 97 per cent. in 460 hr. at 105 deg. C., and 60 per cent. in 16 hr. at 265 deg. C.

Trolley 'Buses for Shanghai.—We have been informed, subsequent to the publication of the article, "Trolley 'Buses for Shanghai," in our columns of June 12th, that the curves shown in fig. 1 of the article represent the performance of a 9-ton vehicle; and it should be made quite clear that they are not the performance curves of the Shanghai vehicle. The 9-ton vehicle is driven by a single "Bull" motor, the performance of which is shown in the accompanying curves. The motor is rated at 53 h.p. at 1,040 r.p.m., with 75 deg. C. rise in temperature; it will draw 9 tons maximum load at 20 m.p.h.



Performance Curves for "Bull" Driving Motor.

with full field, and 24 m.p.h. with the field shunted, the r.p.m. per m.p.h. being 78.6 for this performance. It should also be noted that the acceleration of 2.5 m.p.h. per sec. referred to in the article is the starting acceleration of the 9-ton vehicle.

The London Electrical Engineers.—27TH A.A. BATTALION R.E. (T.A.). Honorary Colonel, Col. R. E. B. Crompton, C.B.; Officer Commanding Lieut.-Col. C. H. S. Evans, O.B.E., A.M.I.E.E. The following orders have been issued for July :—

304th Company (Major W. H. Merrett, T.D., A.M.I.E.E.).—Mondays, 7 p.m. to 9.30 p.m. H.Q., Royal School of Mines, and Hyde Park. Musketry, Rainham Ranges, July 12th, 12 noon.

305th Company (Major A. W. Mawby, O.B.E., A.M.I.E.E.).—Tuesdays, 7 p.m. to 9.30 p.m. H.Q., Royal School of Mines and one mobile station. Musketry, Rainham Ranges, July 12th, 3.30 p.m.

306th Company (Major F. C. Clarke, A.M.I.E.E.).—Fridays, 7 p.m. to 9.30 p.m. H.Q., Hyde Park and Royal School of Mines. Musketry Rainham Ranges, July 26th, 12 noon.

Two officers and detachment of twelve lights at Wembley throughout the month.

Railway Station Lighting.—Trains on a south-western United States railroad, upon approaching certain of the very small stations, actuate an electrical relay by touching a mechanical device on the track and thereby light the station lamps. As they reach a certain distance in departing from the station, they turn the lights out.

New Process for Platinum Extraction.—According to the *Financial News*, a Pietersburg man has invented plant for the extraction of platinum and the treatment of refractory ores, which, it is claimed, has satisfied prominent mining men as to its practicability. It is reported that tests prove that platinum, iridium, gold, silver and base metals, can be completely dealt with. The cost of the treatment is estimated at 2s. per ton, exclusive of technical and labour costs. Tests with Lydenburg and Waterberg platinum ores have given good results, and there are prospects of an improvement of the process which will be within the reach of small capital.

Since the discovery of platinum-bearing reefs in the Lydenburg district, there have been a number of reports of occurrences of this valuable metal or of the rocks in which it has recently been found, at widely separated points in Southern Africa.

It is interesting to note that these reports all refer to areas which lie fairly close to the same meridan, and are, therefore, parallel to what remains of the western scarp of the Rift Valley. If this is not merely a coincidence, platinum-bearing rocks may yet be found still further to the north in Northern Rhodesia and Tanganyika Territory, and possibly in other Central African territories as well.

The I.E.E. in China.—We have received from Mr. C. S. Taylor, the honorary secretary and treasurer of the China Centre of the Institution of Electrical Engineers, a recent photograph of the members of the Centre; this is reproduced herewith. The occasion was a conference which was held in Shanghai on May 1st and 2nd. A number of technical matters were discussed and the conference closed with a dinner at which the chairman, Mr. T. H. U. Aldridge (chief engineer of the Shanghai Municipal Electricity Department), gave an interesting address upon the failure, in 1923, of a 20,000-kW turbine in the power station which is under his supervision. He also spoke of the effect of superheated steam upon the casings of two 18,000-kW turbines at the same station. Among other matters dealt with in the address were questions relating to turbine design, particularly with regard to investigations made into the "fluttering" of turbine wheels.

The following is a key to the members who appear in the photograph:—

Back row: A. J. Percival, N. Denison, H. J. Moysey, R. A. E. Denton, T. Oliphant, H. J. Gwyther, G. Finlay, O. L. Ilbert, A. D. Buchanan, R. L. Evans, L. Beaumont, S. Y. Chang, V. Rose, A. S. Phillips, J. E. M. Barnes.

Front row: E. A. Mills, P. H. Cole, F. S. Heys J. S. S. Cooper (vice-chairman), T. H. U. Aldridge (chairman), F. R. Scott (guest), C. S. Taylor (honorary secretary and treasurer), C. M. Perrin, Dr. H. Chatley (guest).

A Conference of Electrical Engineers at Shanghai.

Civil Service Commission.—FORTHCOMING EXAMINATIONS FOR ASSISTANT ENGINEER AND FOR INSPECTORS IN THE ENGINEERING DEPARTMENT OF THE GENERAL POST OFFICE.—The latest date for the receipt of application forms for assistant engineer is July 30th, and for inspectors in engineering August 27th. Particulars and forms of application can be obtained from the Secretary, Civil Service Commission, Burlington Gardens, W.1. (See our advertisement pages to-day.)

E.A.W. Showroom Visit.—On Friday afternoon, June 26th, a large party of members of the Electrical Association for Women visited Mazda House, Oxford Street London, where a keen interest was displayed in the domestic cookers, washing machines, and also the wireless apparatus. Short talks were given by members of the B.T.-H. staff on the "Domestic Application of Electricity" and "Battery Charging," after which the members were entertained to tea.

Artificial Waterfall for Hydro-Electric Scheme.—*Power* says that a project for supplying the north-eastern provinces of Spain with electric power, originally planned and financed by Mr. Pearson, a Canadian banker who perished on the *Lusitania*, provides for the construction of a large artificial waterfall at the town of Mequinenza on the River Ebro. The big artificial lake will also be used for an irrigation system in the surrounding districts.

International Tramway Congress.—The third congress of the International Tramways and Light Railways Union was held in Budapest from June 21st to 25th. In connection with the congress an exhibition of appliances, &c., was held and delegates paid a visit of inspection to the electrified portions of the State railways.

Modern Stage Lighting.—On June 23rd, members of the Illuminating Engineering Society paid a visit to Drury Lane Theatre, by the courtesy of Sir Alfred Butt, and Mr. H. Mather, the electrical engineer in charge, demonstrated the lighting arrangements. The very large stage at Drury Lane receives illumination by many methods and lamps of histori: interest are used side by side with those of the latest pattern. Thus, the overhead lighting could be furnished by the conventional battens of coloured lamps; but in addition gasfilled lamps in concentrating reflectors, equipped with gelatine screens giving a varied series of colours are in use. Spotlight projectors at the side are likewise furnished with rotating screens equipped with coloured diaphragms, and in the wings limelight projectors are still used and give a powerful light, though projectors using electric incandescent lamps are being experimented with as well. Arrangements have also been made for the more recent form of projection of light, from arcs above the gallery. Other special units for the illumination of scenery were shown in operation an interesting feature here being the use of batteries of cylindrical fittings, each provided with tubular gasfilled lamps specially constructed for the purpose.

Following the visit members adjourned to Magnet House, by the invitation of the General Electric Co., Ltd., where a discussion on "Stage Lighting" took place. Major A. Klein pointed out the great possibilities of modern methods, involving the use of colour and the projection of pictures, alluding to such devices as the recent accompaniment of concerts by the Clarilux colour-organ, and the spectacular effects contrived by Mr. A. Samoiloff at the London Hippodrome. As soon as managers realised the possibilities of modern apparatus they would be willing to make the necessary expenditure, but at present this presented one of the chief difficulties in getting new methods taken up. Other speakers referred to the need for co-operation between the manager, the actor, and the illuminating engineer, and Mr. L. Gaster, in returning thanks to the General Electric Co. for its hospitality, recalled that Mr. Fagan, in a paper read before the Society some years ago, had emphasised the important part played by lighting on the stage. The Society was anxious to do everything possible to promote co-operation between the producer and the lighting expert and he agreed that the stage presented a great opportunity for the services of the illuminating engineer.

Electrification of Sicilian Sulphur Mines.—According to *Chemical and Metallurgical Engineering*, an important electric power development is expected to have government encouragement, as induced by the intensive production policies of Signor Mussolini, in connection with the Sicilian sulphur industry, in which, hitherto, few progressive methods have been employed. The industry covers an area of approximately one-fifth of the island, and employs about 20,000 workers.

An Electrically-operated Open-Pit Coal Mine.—What is claimed to be the first completely electrified open-pit coal mine in the United States at the new town of Colstrip, approximately 35 miles south of Forsyth, Montana, with a coal bed about 180 acres in extent and 25 ft. deep, is owned by the North-western Improvement Co., and is being worked by Messrs. Foley Brothers, general contractors, of St. Paul, Minnesota. The coal is sub-bituminous with a heat content of 11,000 B.th.u., and will be used for the locomotives of the Northern Pacific Railroad in Montana. In order to utilise electricity in mining the coal, an extension of the Montana Power Co.'s 55,000-volt transmission line was made to supply the electrical equipment for stripping the overburden from the coal, mining the coal itself, and hauling. The equipment consists of a Marion model No. 300 electric shovel with a 155-ft. boom and six-yard bucket, used as a drag-line excavator for stripping; a Bucyrus model No. 175-B coal-loading shovel, and two 60-ton electric storage-battery locomotives. The locomotives are the largest storage-battery units which the General Electric Co. has built. They are equipped with Exide ironclad lead batteries of a special size and include a motor generator in the cab of each for charging. During the time spent at the shovel while the cars are being loaded, a flexible cable from a bank of transformers on the shovel is plugged into the locomotive for charging. While coal is being mined from one strip, the overburden is being removed from the next and is cast into the excavation resulting from the removal of the coal.

"Wireless" Motion Pictures.—According to Press reports from America, motion pictures of a windmill in action were projected, with the aid of radio, on a screen five miles away. The inventor, Mr. Francis Jenkins, of Washington, predicted that his apparatus would be sufficiently refined in a year's time to make wireless motion pictures practical for commercial use.

Appointments Vacant.—Plumber-jointer, for Harwich Corporation electricity department; shift engineers, for the Penang Municipal Commission ($325 per month+; dollar= 2s. 4d.); second clerk in Borough of Colne electricity and tramways department. Junior technical assistant (£279) for the R.A.E.S., Farnborough. (See our advertisement pages to-day).

Imperial College of Science and Technology.—The Appointments Board of the College invites employers requiring men who have received a thorough training in the principles of engineering and who have obtained the diploma of the City and Guilds (Engineering College) to make use of the services of the Board. (See our advertisement pages to-day.)

Electricity Representation at Motor Exhibition.—The accompanying illustration is of a 2-ton electric lorry which the Glasgow Corporation Electricity Department had fitted up to represent a house as an exhibit in a parade of motor vehicles held in Glasgow on June 6th. The imitation brickwork foundation of the house was in red, and was overprinted with advertising matter relating to a hire-purchase scheme of wiring houses which the Glasgow Corporation has adopted. The exhibit proved a success.

Glasgow Corporation Exhibition Vehicle.

Sir David Salomons's Bequests. — According to the *Daily Telegraph*, the late Sir David Salomons, Bt., under his will, to which brief reference was made last week, left £5,000 to Gonville and Caius College, Cambridge, for extending the college buildings, and £1,000 in augmentation of the Salomons Scholarship Fund to enable the College to give this scholarship more frequently or for longer terms of tenure. To the Royal Institution he left his large magnet (designed by him and known as the Broomhill Magnet), and all the apparatus belonging to it, which enables the magnet to be used, amongst other things, as a polariscope, and for other purposes. His tube of radium and any other capsules of radium are bequeathed to his widow. Subject to his widow's interest, he left to the University of Cambridge all his scientific instruments and medical apparatus properly belonging to the workshops or laboratories and theatre, his collection of crystals and other apparatus used for polariscope work, &c.

Electricity for Air Compressors on Ships.—According to *Power*, the Ford Motor Co. is having the *East Indian*, one of the Shipping Board's steam propelled boats, converted to Diesel propulsion for transporting Ford automobiles overseas. The propelling units will consist of two sets of Sun-Doxford opposed piston solid-injection engines, each having 4 cylinders, 21½-in. bore, and a combined stroke of the opposing pistons of 85 in. These engines, when turning at 85 r.p.m., will develop 2,500 b.h.p.

There will also be installed two 225 h.p. Worthington-Diesel engines of the two-cycle solid-injection type, direct coupled to electric generators for supplying three-stage air compressors which will furnish compressed air for manœuvring the ship, and also for supplying the electrical auxiliary equipment on the ship.

Institution Notes.

Institution of Electrical Engineers.—MODEL FORM OF GENERAL CONDITIONS OF CONTRACT (EXPORT).—The Institution of Electrical Engineers has issued the two following additional sets of model conditions of contract for the supply of plant and materials (excluding cables) and the execution of work connected therewith:—B1. Conditions recommended for use in connection with export contracts (delivery f.o.b.); B2. Conditions recommended for use in connection with export contracts (including complete erection or supervision of erection). Copies of each may be obtained from the Secretary of the Institution, or from the publishers, Messrs. E. & F. N. Spon, Ltd., price 1s., post free.

Junior Institution of Engineers.—On Saturday, June 20th, members and friends of the Sheffield Branch of the Institution paid a visit to the works of the D.P. Battery Co., Ltd. Bakewell, where they saw the latest developments in the manufacture of storage batteries of all descriptions, from small portable cells suitable for wireless and other purposes, to submarine cells weighing nearly ½ ton each. Particular interest was taken in the casting of the special grids for Kathanode plates and also the machines for casting the multifarious types of plates developed by the company. On behalf of the visitors the president, Professor J. Husband, expressed their appreciation of what they had seen.

Our Personal Column.

(Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements).

At the close of the annual general meeting of the Electrical Contractors' Association (Inc.), held at 15, Savoy Street, W.C.2, on Thursday, June 18th, Mr. LEONARD G. TATE, the General Secretary, was presented with a silver salver and a cheque. Mr. Walter Riggs, the President, stated that Mr. Tate's connection with the Electrical Contractors' Association dated back to 1902, when he first became a member. He was appointed to the Council of the Association in 1904; he was elected first as hon. secretary of the London Branch, then as honorary general secretary in 1905. In 1918 he was appointed general secretary. Mr. Tate had, therefore, completed 21 years' active service with the Association, and he (Mr. Riggs) considered that a very opportune occasion to mark the esteem held for him by the whole of the membership throughout the country. The assiduity with which Mr. Tate had looked after the interests of electrical contractors since the formation of the Association was extremely gratifying, and his marked ability in all difficulties with which contractors were confronted, was appreciated by the whole of the membership. Mr. H. Willoughby-Ellis, as chairman of the London Branch of the Electrical Contractors' Association associated himself with this mark of esteem, and expressed the hope that Mr. Tate would for many years to come continue to be of such service to the whole industry. Further expressions of appreciation were voiced by Mr. W. A. Shaw (as representing the Manchester Branch, and as one of the early presidents of the Association), Mr. R. Robson (as secretary of the Northern Section and a member of the first Council of the Electrical Contractors' Association), Mr. H. J. Miles (as chairman of the Southern Section and on behalf of the Sussex Branch), Mr. E. M. Parsons (as chairman of the Northern Section), and Mr. T. E. Alger (the President of the Electrical Contractors' Association for the ensuing year), who spoke on behalf of the Western Section. Mr. W. R. Rawlings, the first President of the Association, referred to his long association with Mr. Tate, stating that he considered that the best thing the Association had ever done was to persuade Mr. Tate to relinquish his business in 1918, and so be able to devote the whole of his attention to the benefit of electrical contractors. The presentation salver, which was then handed to Mr. Tate, bore the following inscription:—"Presented to Leonard G. Tate, M.I.E.E., by the members of the Electrical Contractors' Association (Incorporated), as a token of esteem and mark of appreciation for the valuable services rendered by him on their behalf during the first 21 years. July, 1925." Mr. Tate, who was obviously touched by the many expressions of goodwill and appreciation expressed his thanks to everyone concerned, and stated that if what he had tried to do for the Association had been appreciated by the members, this was sufficient reward in itself.

At a recent meeting of the Lancaster Town Council, a recommendation of the Electricity Committee to increase the salary of the borough electrical engineer (Major G. C. MILNES) by £75 immediately and by a further £85 next year, was discussed. The chairman of the Committee said that the proposed additions were in accordance with the I.M.E.A. scale; the increase would be a fair recognition of Major Milnes's ability and the increased output at the new works. He considered that Major Milnes had saved the undertaking thousands of pounds. An amendment to refer the matter back to Committee was put forward on the ground that it was no time to increase salaries having regard to the prevalent unemployment. This amendment was carried by a small majority.

MR. G. P. SHALLCROSS, the Birkenhead electrical engineer, is due to retire on July 30th on reaching the age of 65 years, but the Electricity Committee recommends the retention of his services for a further 12 months.

Mr. GEORGE PATON, who for the past 2½ years has been in charge of the London radio sales department of the British Thomson-Houston Co., Ltd., has now taken up his new appointment as assistant manager to the Radio Department of the company at Coventry. Mr. A. E. MOODY has succeeded to his late position.

MR. T. P. PASK has been appointed chief electrical engineer of the South African Railways and Harbours Board.

The Blackburn Council has rejected a proposal to increase the salary of the manager of the tramways (Mr. J. H. COWELL) from £800 to £1,000 per year.

MR. ANDREW GARDNER, of Linlithgow, is to take charge of the interests of Callender's Cable and Construction Co., Ltd., in New York.

MR. S. F. BICKELL, A.M.I.E.E., has left the Prompton and Kensington Accessories Co., Ltd., to take up the post of manager and designer of the Heating and Cooking Department of the Cable Accessories Co., Ltd.

The Llandudno Urban District Council has approved a recommendation of the Electricity Committee to increase the salary of Mr. MORTON, the electrical engineer, from £413 to £500 per annum.

Mr. H. C. LAMB, M.I.E.E., M.I.Mech.E., who has been appointed chief engineer and manager of the Manchester Corporation electricity undertaking, to succeed Mr. S. L. PEARCE, who is now one of the Electricity Commissioners, is 47 years of age. His experience of the Manchester system extends over some 23 years, for he joined the staff of the department as an engineer-in-charge at the generating stations in 1902. He was appointed resident engineer at the Stuart Street generating station in 1913, and he has acted as deputy to Mr. Pearce during the last 6½ years, including, of course, the latter's period of absence in Australia. As our readers are aware, Mr. Lamb is at present chairman of the North-Western Centre of the Institution of Electrical Engineers. Glancing back at his pre-Manchester days we may note that he obtained his early training with Messrs. George Clarke, Ltd., marine engineers, of Sunderland, and with Messrs. Scott & Mountain, electrical engineers of Newcastle-on-Tyne. He received his technical education at the Rutherford College and the Durham College of Science. He served on the staffs of the Electric Supply Co. at Preston and the Wigan Electricity Department, before going to Manchester.

The recommendation of the Manchester Corporation Establishment Committee respecting Mr. Lamb's appointment reads as follows:—"That Mr. H. C. Lamb (now Deputy Chief Engineer at the remuneration of £1,330 per annum) be appointed Chief Engineer and Manager in succession to Mr. S. L. Pearce,

Lafayette] *[Manchester.*

Mr. H. C. Lamb,
the new Chief of the Manchester Electricity Undertaking.

as and from August 1st, 1925, at a salary of £2,500 per annum, which includes all fees and emoluments for the completion of the Barton Power Station." It was also recommended:—"That Mr. H. A. Ratcliffe (now Superintending Electrical Engineer at the remuneration of £950 per annum) be appointed Deputy Chief Engineer at an inclusive salary of £1,300 per annum, rising to £1,500 per annum, as follows:—From August 1st, £1,300; from August 1st, 1926, £1,400; from August 1st, 1927, £1,500."

We reproduce herewith a portrait of Mr. THEODORE STRETTON, who has been elected president of the Association of Mining Electrical Engineers. Mr. Stretton, who was born in 1876, was educated at St. Edmund's College, London, the Regent Street Polytechnic, and Cardiff University College, subsequently serving an apprenticeship with Messrs. Brown, Lenox and Co., Pontypridd. He then became assistant engineer with Messrs. Robert Blackwell & Co., Ltd., afterwards going to Dublin as engineer-in-charge of the Ringsend power station.

H. J. Whitlock & Sons] *[Cardiff.*

Mr. Theodore Stretton, M.I.E.E., M.I.Mech.E.
President of the Association of Mining Electrical Engineers.

Upon leaving Dublin he was appointed engineer in the South Wales district and superintended the carrying out of several of the earliest tramway and overhead transmission contracts in that area. In 1906 he entered into partnership with Mr. S. B. Haslam and is now joint managing director of Messrs. Haslam & Stretton Ltd., electrical and mechanical engineers. Mr. Stretton is a member of the Institutions of Electrical and Mechanical Engineers, the Iron and Steel Institute, and the South Wales Institute of Engineers. He has had a great deal to do with the standardisation of colliery apparatus, being a member of the B.E.S.A., and he was the principal patentee of the "Thor" miner's lamp.

The *Surrey Advertiser* reports that the Epsom Urban Council has given three months' notice to terminate his appointment to its electrical engineer, Mr. A. C. GILLING, and granted him leave of absence for the period in question. The assistant electrical engineer, Mr. H. J. EVANS, has also been given one month's notice, and granted one month's leave of absence. The post of electrical engineer has been advertised.

Wolverhampton Corporation Electricity Committee has appointed Mr. W. N. GORDON commercial secretary to the Electricity Department at a salary of £355 per annum, plus bonus.

The erection of the power station buildings in Hibernia Street, George Cape Province, has been commenced, and Mr. A. S. CHAMERS, of Alice, has been appointed resident electrical engineer.

Obituary.—MR. W. ARNOT.—The death took place on June 24th of Mr. William Arnot, one of the best-known electrical engineers in Glasgow. The first electrical engineer to be appointed by the Corporation, he took up his duties in 1890 and was responsible for the erection of the first municipal electrical installation in the city. On the completion of the Port Dundas and St. Andrew's Cross stations Mr. Arnot retired from the Corporation, and in 1898 set up in private business. He had been a member of the Institution of Electrical Engineers since 1891.

Wills.—The late Mr. JOHN SAMPSON (of Dick, Kerr & Co., Ltd.) left £75,412 gross and £66,567 net personalty.

The gross value of the estate of Mr. E. B. ELLICE-CLARKE (Edison Swan Electric Co., Ltd., and other companies) was £47,331, and the net personalty £46,614.

The late Sir W. M. ACWORTH left £26,960 gross and £19,478 net personalty.

New Companies Registered.

Electric Development Syndicate of Northern Ireland, Ltd. (N.I. 255).—Private company. Registered June 19th in Belfast. Capital, £100 in £1 shares. Objects: To promote or assist in promoting Bills in Parliament of Northern Ireland to grant permission for the supply of electrical energy for any purpose to any town, place, &c. The first directors are:—F. A. Heron, Maryfield, Holywood, D.L.; and A. S. Merrick, 32, Wellington Park, Belfast, solicitor. Solicitor: A. S. Merrick. Registered office: 7, Wellington Place, Belfast.

Horstmann, Ltd. (206,853).—Private company. Registered June 25th. Capital, £10,000 in £1 shares. Objects: To carry on the business of motor, electrical, mechanical and general engineers, carriers, transport agents, &c. The first directors are:—S. A. Horstmann, Onega Lodge, Upper Bristol Road, Bath; W. S. Butler, West Lodge, Englescombe Lane, Bath; J. W. Rooke, Westfield House, Upper Weston Road, Bath; E. H. Horstmann, Widcombe Crescent, Bath; and E. J. White, Beckford, Bathwick, Bath. Qualification, £500. Remuneration as fixed by the company. Solicitors: E. J. White & Co., 24, High Street, Bath.

Electro-plating (1925), Ltd. (206,821).—Private company. Registered June 24th. Capital, £2,500 in £1 shares. Objects: To acquire the business of electro-plating and lacquering in all its branches carried on by G. Morrison at Blackpool, and St. Annes, Lancs. The permanent directors are:—G. Morrison, 1, Mersey Road, Blackpool, electrical engineer; and E. W. Hough, 2, Harley Road, Blackpool, secretary. Qualification, £250. Solicitor: S. O. Taylor, 19, Birley Street, Blackpool. Registered office: 30, Birley Street, Blackpool.

Hulton & Hinchliffe, Ltd. (206,823).—Private company. Registered June 24th. Capital, £500 in £1 shares. Objects: To acquire the business of electrical and general engineers carried on by W. W. Hulton and H. Hinchliffe at Oldham as "Hulton & Hinchliffe." The permanent directors are:—W. W. Hulton, 89, Waterloo Street, Oldham, electrical engineer; and H. Hinchliffe, 42, Bottom o' th' Moor, Oldham, electrical engineer. Qualification: £100. Remuneration as fixed by the company. Secretary: H. Hinchliffe. Solicitor: R. O. Mellor, 7, Church Lane, Oldham.

Falconar, Cross & Co., Ltd. (206,875).—Private company. Registered June 26th. Capital, £7,000 in £1 shares (3,500 5 per cent. cumulative preference and 3,500 ordinary). The objects are: To adopt an agreement with O. L. Falconar and W. Cross, and to carry on the business of electrical engineers and contractors formerly carried on by them at Newcastle-upon-Tyne, and that of manufacturers of and dealers in wireless apparatus and appliances, motor cars, &c. The first directors are:—O. L. Falconar, 44, Sanderson Road, Jesmond, Newcastle-upon-Tyne, electrical engineer; W. Cross, 22, Gowan Terrace, Jesmond, Newcastle-upon-Tyne, electrical engineer. Qualification, £100. Remuneration as fixed by the company. Solicitors: Sutton, Cheshire & Thompson, 12, Moseley Street, Newcastle-upon-Tyne. Registered office: 7 and 9, Ridley Place, Newcastle-upon-Tyne.

Belgravia Electrical Co., Ltd. (206,694).—Private company. Registered June 18th. Capital, £2,000 in £1 shares. Objects: To carry on the business of engineering contractors, general engineers, mechanical, constructional, marine, and civil engineers, manufacturers of, and dealers in electrical, magnetic, or galvanic engines and motor engines of all kinds, and all parts, accessories and things requisite and capable of being used in connection with the above or in connection with electrical engineering, wireless telephony and telegraphy, electric lighting, heating, carpentry, &c. The first directors are:—H. S. Marquand, "Northwood," Woodcote Road, Leigh-on-Sea, electrical and marine engineer (permanent); H. C. Garland, 40, Crusoe Road, Mitcham, company secretary. Qualification, 10 ordinary shares. Remuneration as fixed by the company. Secretary: H. C. Garland. Solicitor: W. Scott, Jamaica Buildings, St. Michael's Alley, Cornhill, E.C.3. Registered office: Adams House, 23, Old Queen Street, Westminster, S.W.1.

Electricity (Hull), Ltd. (206,763).—Private company. Registered June 20th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers of, contractors for and dealers in wires, lamps, fittings, accumulators, batteries, dynamos, motors, magnetos, indicators, bells, switches, controls, valves, telephonic and telegraphic instruments and apparatus, and wireless goods, appliances and accessories, electrical, mechanical, and general engineers, &c. The permanent directors are:—W. Hancock, 127, Alliance Avenue, Hull, fruit merchant (chairman); G. A. Allenby, 162, Chanterlands Avenue, Hull, electrician (managing director); C. W. Foster, 37, Wolfreton Road, Anlaby, near Hull, locomotive driver. Qualification, £50. Secretary: C. W. Foster. Solicitors: Middlemiss, Pearce and Miller, Hull.

Fada Radio, Ltd. (206,768).—Private company. Registered June 20th. Capital, £500 in £1 shares. Objects: To acquire the trade mark "Fada," No. 438,626, and to carry on the business of manufacturers, exporters, importers, and distributors of, and dealers in radio, electrical, and scientific apparatus, installations, accessories, &c. The subscribers (each with one share) are:—W. J. Roche, 451, East 22nd Street, Brooklyn, New York, U.S.A., clerk; E. S. Daniells, "Waconsta," The Bishop's Avenue, N.2, merchant. The first directors are:—F. A. D'Andrea (permanent governing director and chairman), address not stated; W. J. Roche; and E. S. Daniells. Qualification, £1. Remuneration (except managing directors, if any), as fixed by the company. Solicitors: R. C. Partlett & Co., 44, Bedford Row, W.C.1.

Pearl Electrical Co., Ltd. (206,808).—Private company. Registered June 22nd. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of, and dealers in electrical goods and accessories, &c. The first directors are:—G. W. Cavell, 168, Cambridge Street, Belgravia, S.W.1, electrical engineer; J. A. Hansen, 36, Tennyson Street, Battersea, S.W.11, foreign correspondent. Solicitors: Lawson & Lawson, 181, Queen Victoria Street, E.C.4. Registered office: Edinburgh Mansions (Howick Place), Victoria Street, S.W.1.

A. F. Yarnold, Ltd. (206,867).—Private company. Registered June 26th. Capital, £2,000 in £1 shares (500 7 per cent. cumulative preference and 1,500 ordinary). Objects: To carry on the business of electrical engineers, electrical constructors, contractors, dealers in, and agents for electrical plant, supplies, lamps and bells, telephone contractors, &c. The directors are:—A. F. Yarnold, 132, Gleneagle Road, Streatham; B. W. Oakley, 33, Conyers Road, Streatham; F. H. Campbell, 42, Hillcourt Road, East Dulwich; C. J. Bennett Ashby, 29, Riggindale Road, Streatham, S.W. Qualification, £10. Remuneration, £10 each per annum. Secretary: F. H. Campbell. Solicitor: G. A. Martin, 6, Guildhall Chambers, 31, Basinghall Street, E.C. Registered office: 19, Shrubbery Road, Streatham, S.W.

Wireless and Radio Trades Guardian Association, Ltd. (206,919).—Registered June 27th as a company limited by guarantee and not having a share capital with 500 members each liable for 5s. in the event of winding up. The income and property of the Association shall be applied solely towards the promotion of its objects, and no portion shall be paid or transferred by way of dividend, bonus, or otherwise by way of profit to the members, provided that the company shall not be prevented from paying remuneration to any officer or servant of the company or to any member or other person in return for any services rendered. The objects are: To provide an organisation for uniting the signatories and any other persons, firms, associations, or companies engaged in or connected with wireless telephony or telegraphy, including television, or any business allied thereto, to disseminate legal and other information, to protect members against persons unworthy of credit, to collect debts for members, &c. The subscribers are:—C. Latham, 15, Fastcheap, E.C., certified accountant; H. Hodson, Lytham Villa, Park Road, E.12, clerk; A. Middleditch, 20, Copland Road, Wembley, clerk; H. Turner, 9, Oakmead Road, S.W.12, clerk; A. V. Hunter, 6, The Shrubberies, S. Woodford, clerk; J. H. Long, 47, Felixstowe Road, Lower Edmonton, N., clerk; F. S. Gardner, 66, Tachbrook Street, S.W.1, clerk. The management is vested in an executive committee, the first members of which are not named. C. Latham, F.L.A.A., is secretary and accountant to the company.

Norman Radio, Ltd. (206,947).—Private company. Registered June 29th. Capital, £1,000 in £1 shares. Objects: To carry on the business of makers and workers of, and dealers in private and other telephones and telegraphs of all kinds, electricians, &c. The directors are:—J. Portwine, "Three Gates," College Road, Dulwich, S.E.21 (director of Solidite Manufacturing Co., Ltd.); C. W. Rooke, 17, Rusthall Avenue, Bedford Park, W.4, chartered accountant. Secretary: H. W. Bramley, "Shalimar," Central Avenue, Rochford, Essex. Registered office: 139a, Upper Street, Islington, N.1.

X.L.O. Co., Ltd. (206,906).—Private company. Registered June 27th. Capital, £1,000 in £1 shares. Objects: To acquire the business of the X.L.O. Co. as electrical engineers carried on at 48, Strand, W.C., and 122, Pentonville Road, N.1, and to carry on the business of wireless contractors, manufacturers, importers and exporters, &c. The subscribers (each with one share) are:—O. R. C. Sherwood, 122, Pentonville Road, N.1, electrical engineer; S. B. White, 122, Pentonville Road, N.1, engineer. The first directors are not named. Solicitors: Cochrane & Cripwell, Balfour House, 119, Finsbury Pavement, E.C. Registered office: 122, Pentonville Road, N.1.

Official Returns of Electrical Companies.

Boston Wireless and Electrical Co., Ltd. — Debenture dated June 12th, 1925, to secure £500 charged on the company's property, present and future, including uncalled capital. Holder: Mrs. G. L. Bostandji, Coniston Villa, Burnage Lane, Levenshulme, Manchester.

General Radio Co., Ltd.—Particulars filed of £3,000 debentures authorised May 28th, 1925, charged on the company's property, including uncalled capital, the amount of the present issue being £1,500.

Will Smith, Ltd. — Particulars filed of £400 debentures authorised May 25th, 1925, charged on the company's undertaking and property, present and future, including unpaid capital, the amount of the present issue being £200.

British Arc Welding Company (Bristol Channel), Ltd.—Mortgage on freehold land, hereditaments and premises at Hope Street, Cardiff, dated June 8th, 1924, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

Charles Coton & Co., Ltd.—Satisfaction in full on June 6th, 1925, of mortgage dated October 21st, 1906, securing £1,600.

Receptors, Ltd.—Particulars filed of £20,000 debentures authorised May 14th, 1925, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £500.

Grierson Ledway Co., Ltd. — Mortgage debenture dated June 13th, 1925, to secure £3,000 charged on the company's property, present and future, including uncalled capital. Holder: R. Hannah, 115, Abbey Road, Barrow-in-Furness.

Acme Electric Lamp Co., Ltd.—First debenture and second debenture, both dated May 28th, 1925, to secure £1,400 and £1,151 respectively, charged on the company's undertaking and property, present and future. Holders: Mrs. M. Tyler, 47, Rudloe Road, Balham; and H. S. Tyler, 2 and 3, Station Road, Balham.

L. Jacobs (London), Ltd.—Debenture dated May 22nd, 1925, to secure £2,500 and moneys due or to become due under guarantees given at the request of the company, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: W. Rose, "Stonington," Station Road, Hendon, N.W.

Rheostatic Co., Ltd.—Mortgage dated May 29th, 1925, constituting a specific charge on 31, Mackenzie Street, Slough, and all other, if any, hereditaments and premises comprised in an indenture of the same date and a floating charge on the company's undertaking and property, present and future, including uncalled capital, to secure all moneys due or to become due from the company to the District Bank, Ltd.

Pope's Electric Lamp Co., Ltd.—Satisfaction in full on June 16th, 1919, of Land Registry Charge dated April 16th, 1909, securing all moneys due or to become due from the company to the London City and Midland Bank, Ltd. (Notice filed June 10th, 1925.)

City Notes.

Reports and Meetings of Electrical Companies; Dividend Results, &c.

Globe Telegraph & Trust Co., Ltd.

The annual meeting was held on June 23rd, Sir John Denison-Pender, C.B.E., presiding. In presenting the report and accounts (see ELEC. REV., June 19th, p. 989), the chairman said that the results were again satisfactory, the net income having increased by £5,098, in spite of lower receipts from the American holding due to the rise in the value of the pound sterling. Their income from the Submarine Cables Trust was diminishing owing to the drawing of the bonds but the proceeds were being reinvested. The amount thus received during 1924 had been invested in the Commercial Cable Company's 4 per cent. debenture stock, which gave a lower return but was a sound investment. The investment in the French Telegraph Company had been written off, that company having gone into liquidation with liabilities exceeding the assets. They had again been able to transfer a considerable sum to reserve, making it £105,000. The invested reserves of the cable companies comprising their holding amounted to a large figure and the companies were therefore able to provide any new cables which were required to meet developments. The value of the company's holdings at May 31st last showed an appreciation of £2,167,881 over cost.

Aron Electricity Meter, Ltd.

Mr. Harry Kahn presided at the annual meeting on June 23rd, and in presenting the report and accounts (*vide* ELEC. REV., June 19th p. 989), said that the value of goodwill and patents, including shares and interests in subsidiary companies, was given as £50,106 in the balance sheet, but the value of shares and interests alone was greater than this figure. The sum carried forward was subject to additional income tax, regarding which the company had a dispute with the authorities with reference to the incidence of taxation during the war. Any amount paid in excess of the reserves would have to come out of the current year's profits; shareholders should, therefore, not be too sanguine about a large ordinary dividend next year. Both the London and Vienna branches showed an increased turnover, especially the latter, but in view of the difficulties with which Austria had to contend the maintenance of the increase was problematical. They had had to increase their London accommodation and had purchased the lease of the present factory and two adjacent buildings.

Delhi Electric Tramways and Lighting Co., Ltd.

The accounts for the past year record gross receipts of £24,935 for the tramway undertaking and £68,894 for the electricity supply undertaking, representing increases of about 4½ and 9¾ per cent. respectively. The combined undertakings show a net revenue of £41,429, as against £36,840 in 1923. After charging debenture interest and London expenses, there remains a profit of £38,410, to which is added £1,304 brought forward, making £39,714. Depreciation absorbs £16,000; the reserve for taxation £4,000; and the renewals reserve £5,000. It is proposed to pay a dividend of 10 per cent. upon the preferred and participating shares, and one of 9.448 per cent. on the ordinary shares, leaving £12,740 to be carried forward. Additions to plant costing £17,743 were made during the year; this was chiefly Diesel plant, switchgear and mains. Further extensions of sub-stations and mains are in progress. It is hoped to complete an agreement during the current year for a bulk supply from the Government generating station. The meeting was held on Tuesday last.

Waygood-Otis, Ltd.

The company's annual meeting was held on June 26th, Mr. H. C. Walker (chairman) presiding. Mr. Walker said that the development of the Falmouth factory was still being proceeded with, and economies in manufacture would result. Developments in Australia and New Zealand had increased the item "Investments and loans." The lift contracts secured during the year were greater in number and value than those of the preceding year, and an increasing number of orders were coming in from overseas. The "Micro-drive" self-levelling lift continued to gain favour, and the sales of that type had considerably increased. The exchange by shareholders of the company's ordinary shares for common stock of the Otis Elevator Co. had resulted in a closer union of the two concerns.

French Companies.

The *Constructions Electriques de France*, after setting aside 3,200,000 fr. for depreciation in 1924, has decided to carry forward a balance of 1,534,000.

The *Compagnie des Lampes*, which is a subsidiary of the Compagnie Générale d'Electricité and the Société Thomson-Houston reports net profits of 11,576,000 fr. for 1924, as against 9,979,000 fr. in the previous year. The dividend is at the rate of 8 per cent., as in 1923.

The directors of the *Forges et Ateliers de Constructions Electriques de Jeumont* state that despite the disturbed economic situation in 1924, the order books were well supplied. Owing, however, to the depreciation of the franc and the increase in the cost of raw materials, the directors had judged it expedient to employ most of the net profits, which amounted to 5,996,000 fr., in augmenting the floating capital necessary for working so as to avoid having recourse to an increase of the capital, the rate of dividend consequently being reduced to 15 fr. per share for 1924.

The *Constructions Electriques de France* records gross profits amounting to 5,789,000 fr. After placing 3,200,000 fr. to depreciation, the balauce has been carried forward.

The *Compagnie d'Entreprises Electro-Mécaniques* reports an increased turnover in 1924, the gross profits and balance forward amounting to 127,000 fr. After applying 115,000 fr. to depreciation, the balance has been carried forward.

The *Compagnie L'Electro-Entreprise* reports gross profits of 1,411,000 fr. for 1924, and after making provision for depreciation, &c., the net sum available amounts to 925,000 fr. The rate of dividend is increased from 6 to 7 per cent.

A liquidator has been appointed by the *Société Industrielle d'Appareillage et de Constructions Electriques (Anciennement Société d'Appareillage Téléphonique Industriel et Sonneries)*, of Paris.

The *Société Electro-Métallurgique de Dives* is increasing its capital from 40 to 45 million francs with the object of taking over the works and business of the Société Hydro-Electrique et Métallurgique du Palais.

Swiss Companies.

The directors of *Brown, Boveri and Company* have resolved to pay a dividend at the rate of 6 per cent. for 1924, and to place 500,000 fr. to reserve.

The *Alioth Electricity Company*, of Basle, which is associated with the above company, reports net profits of 352,000 fr. for 1924, and a dividend at the rate of 5 per cent. as in 1923.

County of London Electric Supply Co., Ltd.—At an extraordinary meeting held on June 29th, Sir Harry Renwick, K.B.E., moved resolutions providing for the increasing of the company's capital to £7,000,000 by the issue of 2,000,000 preference and 2,000,000 ordinary shares of £1 each. He stated that the main object of the issue was to provide for the repayment of 5½ per cent. one-year notes (£1,500,000), which matured in September. The holders of the notes would be given an opportunity of exchanging them for new preference shares. Apart from the Barking undertaking, the company held controlling interests in certain progressive undertakings south of the Thames which were now ripe for profitable development. The resolutions were adopted.

Stock Exchange Notices.—The undermentioned securities have been ordered to be officially quoted :—

Clyde Valley Electrical Power Co.—600,000 ordinary shares of £1 each, 10s. paid, Nos. 600,001 to 1,200,000.

Dealings in the following have been specially allowed by the Committee under Rule 159 :—

Calcutta Electric Supply Corporation.—7,193 ordinary shares of £1 each, fully paid, Nos. 925,001 to 932,193.

Application has been made to the Committee to allow the following to be officially quoted :—

Shropshire, Worcestershire, and Staffordshire Electric Power Co.—150,000 6 per cent. cumulative preference shares of £1 each, fully paid, Nos. 450,001 to 600,000.

United River Plate Telephone Co.—112,000 ordinary shares of £5 each, fully paid, Nos. 648,001 to 760,000.

Kalgoorlie Electric Power & Lighting Corporation, Ltd.—The accounts for the past year show a profit of £18,504, as compared with £12,351 in 1923. After providing for depreciation there remains a balance, including the amount brought forward, of £7,359. This allows of the payment of 6 per cent., less tax, on the income debenture stock. The meeting was to be held yesterday (Thursday).

International Light and Power Co.—The following dividends are announced :—3 per cent. (less British tax) on $1,275,000 preference shares for the half-year ended June 30th; and at the rate of 6 per cent. (less tax) on $174,400 additional preference shares in respect of the period from the date of allotment (April 9th) to June 30th.

Eastern Telegraph Co., Ltd.—The directors announce a dividend at the rate of 3½ per cent. per annum less tax on the preference stock for the quarter ended June 30th, 1925, and a first quarterly interim dividend of 2½ per cent. on the ordinary stock, free of tax, in respect of the year ending December 31st next.

New General Traction Co., Ltd.—The accounts for the year ended at March last show a revenue of £12,700 and a net profit of £9,887—an increase of £1,087. The addition of £2,945 brought forward makes available £12,832, out of which the payment of a dividend of 4½ per cent. is recommended, leaving £3,695 to be carried forward.

Seaton and District Electric Light Co., Ltd.—It was stated at the annual meeting on June 20th that the present scale of charges, which worked out at 8¼d. per kWh, made it impossible for a dividend to be declared, and that new charges of 8d. and 10d. per kWh were to be imposed.

British Columbia Electric Railway Co., Ltd.—The dividend for the half-year ended June 30th has been declared on the 5 per cent. cumulative perpetual preference stock.

Midland Counties Electric Supply Co., Ltd.—The recent issue of 250,000 each of preference and ordinary shares has been fully subscribed by the shareholders.

Eastern Extension, Australasia and China Telegraph Co., Ltd.—The directors have declared an interim dividend for the three months ended March 31st last of 5s. per share, free of tax.

Aster Engineering Co. (1913), Ltd.—The directors report a further loss of £13,032 during the past year, making a total of £40,594.

Marconi's Wireless Telegraph Co., Ltd.—A dividend at the rate of 7 per cent. per annum has been declared in respect of the half-year ended June 30th.

Ferguson, Pailin, Ltd.—An interim dividend of 3¼ per cent. actual has been declared on the ordinary shares.

St. James' & Pall Mall Electric Light Co., Ltd.—The following interim dividends are payable on August 1st :—At the rate of 3s. 6d. on the preference shares, and 5s. on the ordinary shares.

Stocks and Shares.

MONDAY EVENING.

STOCK Exchange business comes by fits and starts. Some of the markets are tolerably active. In others, there is next to nothing doing. The monetary stringency should be eased by the turn of the half-year. The chance of a rise in the Bank Rate is held, once more, to be negligible for the time being.

but the apprehension is liable to revival at any moment, and in consequence, gilt-edged stocks go cautiously, having appreciably recovered, however, from their recent lowest prices. There has been too much outpouring of new issues for these stocks to have yet become properly assimilated by the investor. For some time to come, gilt-edged securities are liable to be affected by the financial indigestion caused by the number of new capital appeals that poured out during May and June.

The County of London Electric Supply Company is likely to experience no difficulty in securing subscription to the two million pounds 6 per cent. new preference shares which it is about to offer. The company held a meeting to-day, Monday, at which sanction was duly given to the raising of the capital from three million pounds to seven million pounds, half to be in preference, half in ordinary. Of the former the shares are to be issued immediately at 20s. 6d. No doubt the two million ordinary shares will be held in reserve until the County Company's Bill has been passed by Parliament, and the capital account can be re-arranged on the new basis rendered necessary by the extension of the company's lease of life under the Act lately passed. The advent of the new preference capital caused a slight dulness in the prices of the ordinary and preference shares, and the former have eased off to 53s. 9d., which is 2s. down on the week. The preference also are a trifle easier at 22s. 6d. These carry more dividend, of course, than the newcomers which are on the point of making their appearance.

City of Londons reacted to 47s., the preference being a shade lower at 23s. Notting Hill preference, quoted ex dividend last Thursday, recovered their 6s. deduction. Clyde Valleys are weaker at 31s. The list is steady as a whole, apart from these changes.

Eastern cable stocks continue dull, in spite of their recent declines. Prices do not seem to have reached those levels at which investment admits temptation. The Eastern company has declared its usual quarterly dividend of 2½ per cent. free of tax for the first part of 1925. Both the Globe shares are ex dividend. Westerns are 5s. down at 16¼. Cuba Submarines fell back to 6¾. United River Plates have hardened to 7.

In the wireless group, Marconis have gone back 3/16 to 27s. 6d., there being no life in the market, and some of the recent applicants for the new shares being apparently desirous of selling them. The 7 p.c. participating preference at 27s. 6d. are ex 8½d. dividend. Canadian Marconis at 4s. 6d. show a trifling gain.

Railway stocks have been pursuing a very uneven track. From their recent despondency, they enjoyed a brisk recovery, prices rising several points for a few days. The improvement, however, has not been held, and public confidence is coy of buying stocks in companies that are so liable to disturbance both from financial causes and also from labour troubles. Underground Electric Railways £10 shares fell to 50s. and the shilling shares to 7s. 6d. Metropolitan Consolidated declined to 70¼. Central London ordinary shed a point. London United Tramway debentures are 45½ ex dividend. British Electric Traction ordinary at 112 is down a nominal 7 points, but most of this is accounted for by deduction of the dividend. The 7 per cent. preference at 104 is also x.d.

Midland Counties Electric keep their price at 23s. 9d. It is announced that the company's recent issue of 250,000 preference and 250,000 ordinary shares, made to the shareholders of the company, has been fully subscribed. Dealings started a few days ago in the 6 per cent. preference shares of the Shropshire, Worcestershire and Staffordshire Electric Power Company. These can be bought at 22s. with dividends in March and September, the yield at the present price being nearly 5½ per cent. on the money. The amount required for the dividend service is £12,500 per annum, which was covered 7½ times over by the profits shown in last year's accounts. South Wales Power 6½ per cent. preference at a guinea yield £6 3s. 6d. ex the dividend payable on July 1st. Urban 6 per cent. preference can be bought at 19s. 3d., and there are a few thousand Westminster Electric 4½ per cent. preference obtainable at 18s. ex dividend, the return in this case being 5 per cent. on the money. These last-named can be regarded as a gilt-edged investment, so ample is the cover for the service of the dividend.

The manufacturing group is a little duller. A fall occurred in General Electrics to 25s., on scattered sales by a few of the people who bought the shares in advance of the dividend announcement, and who sold when the figures came out. Siemens went back to 25s. 9d., a fall of 6d. per share, the present yield on the money being small when matched against that offered by General Electrics and some of the others in this group. British Aluminium weakened to 30s. Callenders new shares are quoted at 6s. 6d. premium, and the senior issue remains at 58s. 9d. ex rights. Babcock & Wilcox at 2 7/16 display a loss of 2s. 6d., the market in iron and steel shares as a whole being what the Stock Exchange terms "tender," although there has been a little support from the North during the past few days.

Rubber shares keep up; the daily volume of trade transacted in this market is still considerable. The price of the produce has further advanced to 3s. 4½d. per lb. for cash. People are selling other Industrials in order to pay for rubber shares, and this explains part of the dulness that has crept into prices of shares in other companies whose prospects are held to lie more in the future than in the present.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom. £	Dividend. 1923.	Dividend. 1924.	Price June 29, 1925.	Rise or fall.	Yield, p.c.
Bournemouth and Poole ...	1	18	14	22½	—	5 1 10
Brompton Ordinary	1	10	10	13½	—	*5 14 8
Charing Cross Ordinary	1	14½	15	46/9	—	6 6 3
do. do. do. 4½ Pref.	1	4½	4½	17/6	—	5 3 10
Chelsea	1	12	12	14	—	6 8 6
City of London	1	15	15	47 -	— ¼	5 9 1
do. do. 6% Pref. ...	1	6	6	23/-	—6d.	5 4 4
Clyde Valley	1	8	8	31/-	—1/6	5 3 3
County of London	1	15	15	53/9	—2/-	5 11 4
do. do. 6% Pref. ...	1	6	6	22/6	— 6d.	5 6 8
Edmundson's Ordinary	1	7	—	23/-	—	6 1 9
do. 7% Pref.	1	6	7	22/-	—	6 7 3
Elec. Supply Corporation ...	1	1	10	33/8	—	6 0 4
Kensington Ordinary	5	14	15	12½	—	5 16 6
Lancs. Light and Power ...	1	7½	7½	26/6	—6d.	5 13 2
London Electric	1	10	10	35/-	—	5 14 1
do. do. 6% Pref. ...	5	6	6	53	—	5 6 6
Metropolitan	1	10	11	33/8	—	5 16 0
do. 4½% Pref.	1	4½	4½	17/-xd	—	5 5 11
Midland Counties	1	5½	6	23/9	—6d.	5 1 10
Newcastle-on-Tyne Ordinary ...	1	6	7	32/-	—	6 7 3
do. 5% Pref. ...	1	5	5	18/3	—3d.	5 9 7
do. 5% Pref. ...	1	.	7	25/-	—	5 12 0
Notting Hill 6% Pref. ...	10	6	6	10xd	+ ½	6 0 0
North Met. Elec. 6% Pref. ...	1	6	6	1a	—	5 6 8
St. James' and Pall Mall ...	5	17½	17½	11½	—	6 7 3
South London	1	15	15	2a/6	—	6 3 1
South Metropolitan Pref. ...		7	7	14	—	5 12 0
Urban Ordinary	1	4	4	17/-	—	4 14 4
do. 6% Pref. ...	1	6	6	25/-	—	6 0 0
Westminster Ordinary	1	15	15	46/6	—	6 9
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	1	—	7 10 0
Yorkshire Elec.	1	8	8	31/-	—	5 3 3

HOME RAILS.

Central London Ord. Assented Stock	4	4	68	—1	5 17 6	
Metropolitan ... ... ,,	4	5	73½	— ½	7 1 10	
do. District ... ... ,,	3½	3½	48½	—	7 4 4	
Underground Electric Ordinary	10	Nil	Nil	2½	— ¼	Nil
do. do. "A" ...	1/-	Nil	Nil	7/6	—6d.	Nil
do. do. Income	Bonds	6	6	98	—	*6 2 5

TELEGRAPHS AND TELEPHONES

		Dividend. 1923.	Dividend. 1924.			
Anglo-Am. Tel. Pref.	Stock	6	6	105	—	5 14 3
do. Def.	,,	1½	1½	24½	—	6 3 9
Automatic Telephone	1	3	6	2½	—	2 18 1
Chili Telephone	5	6	5	5⅛	—	*5 10 4
Cuba Sub. Ord.	10	5	5	6¾	— ¼	7 8 2
Eastern Extension	10	10	10	17½	—	*5 15 1
Eastern Tel. Ord.	Stock	10	10	175½	—	*5 14 0
Globe Tel. and T. Ord. ...	10	10	10	17½xd	—	*5 14 2
do. do. Pref.	10	6	6	10 7xd	—	5 10 4
Great Northern Tel.	10	22	22	32	— ¼	6 17 6
Indo-European	25	7	8½	41½	—	*4 4 4
Marconi	1	10	—	1½	— 3/16	7 5 6
Marconi Marine	1	10	—	1	—	10 0 0
Oriental Telephone Ord. ...	1	19	19	24xd	— 1/8	*5 2 11
United R. Plate Tel.	5	8	8	7xd	+ 1/16	*5 14 4
Western Telegraph	10	10	10	16½	— ¼	*6 3 10

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	8½xd	—	8 16 0
do. do. 2nd Pref. ...	5	6	6	2½xd	—	10 6 5
do. do. 5% Deb. ...	Stock	5	7	74	—	6 15 1
British Electric Traction Ord. ...	,,	6	6	11½xd	- 2	5 7 2
do. do. 6% Pref. ...	,,	6	6	104xd	—3	5 15 5
Brasil Traction	100	4	4	57½	+ ½	6 19 3
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	91	+1½	5 9 11
do. do. Preferred	,,	95%	95/-	8 ¼	—	*5 10 10
do. do. Deferred	,,	1 9/5	12/6 5	10 6½	—	*6 1 6
do. do. Deb.	,,	4½	4½	75½	—2	5 14 7
Lond. & Sub. Trac. 5% Pref. ...	1	2½	—	6/-	—	Nil
London United Tram. Deb. ...	Stock	4	4	45½xd	—	8 15 10
Mexico Trams, 5% Bonds ...	—	5	5	62½	—	8 0 0
Mexican Light Common ...	100	Nil	Nil	26	—	Nil
do. Pref.	100	Nil	Nil	61	—	Nil
do. 1st Bonds ...	—	5	5	65¼	—1	7 12 8
Yorkshire (West Riding) ...	1	5	—	18/9	—	5 6 9

MANUFACTURING COMPANIES.

Babcock & Wilcox	1	12	12	2 7/	— ⅛	* 4 8 5
British Aluminium Ord.	1	8	10	1½	— 1/16	6 6 0
British Elec. Transformer Pref.	1	Nil	7	17/6	—	... ...
British Insulated Ord.	1	15	15	28	—	4 10 9
Brush Ord.	1	10	10	1	—	10 0 0
Callenders	1	15	15	2½	—	6 2 0
do. 6½% Pref.	1	6½	6½	23/6 xd	+ 6d.	5 9 5
Crompton Ord.	1	Nil	Nil	1	—	... ...
Edison-Swan	4/-	10	10	8/-	—	5 0 0
do. 5% Deb.	Stock	5	5	100 xd	—	5 4 3
Electric Construction	1	10	10	15	—	5 5 1
Enfield Cable, Pref.	1	7½	7½	13xd	- 6d.	5 7 9
English Electric	1	5	5	18/9	—	5 6 8
do. do. Pref.	1	6	6	21/-	—	5 14 3
Gen. Elec. Pref.	1	6½	6½	24/6	—	5 10 8
do. Ord.	1	5	7½	27/-	—6d.	6 0 0
Henley	1	15	16	8	—	5 0 0
do. 4½% Pref.	5	4½	4½	4½	—	5 0 0
India-Rubber	1	5	5	1	—	*5 0 0
Johnson & Phillips	1	10	10	2 5	—	4 17 0
Met-Vickers, Ord.	1	8	9	23/3	—	5 17 8
do. Pref.	2	8	8	21	—	6 14 9
Siemens Ord.	1	—	7½	25/9	—1 d.	* 5 17 8
Telegraph Construction	12	19	19	27	—	4 9 0

* Dividends paid free of Income Tax.

The Incorporated Municipal Electrical Association.

Annual Convention at Brighton.

(*Continued from page* 1014, Vol. XCVI.)

Installation Policy: Its Importance to the Electricity Supply Industry.

By L. L. ROBINSON, M.Inst.C.E., M.I.E.E., M.I.Mech.E.

(*Abstract.*)

(*Concluded from page* 1014, Vol. XCVI.)

Referring to unemployment in a speech at Leeds, Mr. J. R. Clynes, M.P., said: "Under any conditions it was true to say that workmen who limited output were doing themselves the greatest harm. The author hesitates to say anything that might be construed as hostile to labour. Nevertheless, it is necessary to ask whether the workers in the electricity industry are doing their best towards popularising the use of electricity? Whether they are not on a mistaken hypothesis trying too much to advance themselves not with, but at the expense of the rest of the community? Labour costs in wiring and installation work are still abnormally high, higher than in proportion to the increase of wages since pre-war days. Cheap installations will, at the moment, increase the use of electricity more speedily than any other thing we can do for the public, because it is generally admitted that first cost of installation work is the great obstacle to greater progress. Therefore, by working more efficiently, the installation operatives will not keep other men unemployed but will actually increase employment throughout the country in factories making every type of current consuming device, cables, machinery, &c., right away to the feed pumps. At the present time no discussion upon wiring and installations could be complete without a reference to the 8th Edition of the I.E.E. Wiring Rules. Are regulations necessary? The author's opinion is that if only qualified people were allowed to carry out wiring and installation work, regulations would be unnecessary, and that all regulations are defeated unless steps are taken to ensure good workmanship.

It would be far cheaper to allow none other than properly qualified people to have anything to do with electrical installations. The insurance interests are at the bottom of all the tightening up of installation and wiring rules; but do they ever refuse a risk because rules have not been complied with? And is it not a fact that even "curbstoners'" installations are so "safe" that it does not pay an insurance company to send an inspector to survey each risk? How much will an insurance company reduce a premium if a job is carried out under the 8th Edition Regulations instead of under the 7th Edition, or neither? The author is of opinion that it is unwise of the I.E.E. to call the present edition "regulations." They are not enforceable as such by any but one or two undertakings who have special powers to make regulations, and these may foolishly adopt the I.E.E. brand. At the most they are recommendations or draft regulations. As they are not enforceable they are little better than pious opinions and will become a dead letter like the ridiculous speed limits of automobile legislation. Commerce is seldom able to rely for trade upon selling only the absolute and ideally perfect.

It seems to the author quite superfluous to worry so much about Safety First. Even Mr. C. S. Russell, the well-known fire insurance expert, has only known of three cases where fires had an electrical origin in 30 years' experience. The author expects that he attributes the immunity to the power of the old Phœnix Rules, but as these are seldom observed it must really be due to the inherent safety of electricity. It is to be feared that the framers of electricity regulations always have in their mind great factories or public buildings where the responsibility of electricity is so much greater than in houses, small workshops and the usual run of business premises which do, and will increasingly, take the bulk of our output. The author has been asked to quote chapter and verse as to what particular items he objects to. He objects to nearly all of them. Each rule taken individually is almost perfect from the hyper-super-safety point of view, although absolute perfection can never be attained and fatalities may take place even if these costly rules are observed. One important objection is the unconscionable size of flexes imposed upon us, with all the resultant expense and clumsiness of bigger fittings. The new "medium insulation" may only be used for wiring pendants and fittings, and "high grade" must be used for all portable apparatus. This will mean altering the design of most portable fittings, particularly those with knuckle joints which as a rule will take none but the thinnest flex. Twin twisted flex is doomed—it may only be used for fixed wiring, fixed fittings and portable lamp standards. For all other purposes flex must be circular, braided or made up oval. Twin twisted flex is no longer permitted for electric fires or even for irons, toasters, curling tongs, shaving pots kettles, fans, &c. The most drastic and expensive change is the new current density ruling for flex, which is reduced to about half the old value. A six-pound 600-watt iron usually supplied with a light flex and adapter to fit any lampholder must, under the new rules, have a 23/36 or 40/36 flex at 200 volts and a 70/36 at 100 volts. For electric fires the increase in size is even more awful. A 2-kW fire at 100 volts will have to be fitted with a 296/.010-in. or 60/.018-in. flex and at 200 volts 110/.0076-in. As these flexes will have to be circular or oval braided, this increases the diameter still further as compared with present practice, which, in the author's experience, has not been unsatisfactory, and many manufacturers of fires will have to increase the diameters of the bushes through which the flex is led. The cost will vary from 3s. 6d. to 10s. per fire—the author has obtained samples which compare the flexes of present practice with the freaks "regulated" by the I.E.E. Look at the flexes for a 2-kW and 3-kW 100-volt fire! This *reductio ad absurdum* is not the author's—it is that of the Committee who framed the rules. And it is partly due to the earthing regulations which are, in the author's opinion, prohibitive. Is the electrical industry seriously going to advise the public that every coffee urn, every flat iron, and every toaster must be earthed? With regard to this requirement concerning earthing—earthing leads must be of high conductivity copper tinned or otherwise protected from corrosion, and while protected against mechanical injury must be easily accessible. One little undertaking the author knows of sends inspectors round to scrape earth wires to see if they are tinned, and if not is satisfied with daubing them over "where accessible" with a coat of paint.

Another very important clause provides that lamp adaptors shall not be used as plug connectors for appliances taking more than two amperes. Even if the flex rules and earthing rules do not kill the plug adaptor for irons, bowl fires, toasters, soldering irons, &c., this rule definitely settles the matter. Surely the convenience, an enormously important point in connection with two-part tariffs, is worth the small risk which is immeasurably less than that attached to similar gas-heated apparatus. This suppression of the handy little lamp adaptor is a most serious move against the popularising of domestic electrical appliances. These adaptors have been the secret of success on the Continent and in America. The author doubts whether table apparatus would ever have become so widespread in France, Belgium and Germany without them. And we are asked to abolish them. Why? The Electrical Development Association set up a small Committee to give consideration to the 8th Edition of the I.E.E. Wiring Rules, owing to the large number of complaints which had been received from its members, pressing for action in view of the great influence of any wiring regulations on electrical development. The Sub-Committee consisted of a few members of the E.D.A. Council, who could be regarded as generally representative of the four leading electrical supply interests, and in addition three members associated respectively with manufacturers, accessory manufacturers and electrical contractors. In making its specific observations this Committee prefaced its remarks by reminding the Institution that so far no powers existed to make enforceable regulations with the exception of a few supply undertakings which had acquired such powers through special Acts. The Sub-Committee suggested that after the recommendations had been altered or modified they might be submitted for re-drafting by an expert, not necessarily electrical, who would be able perhaps to simplify the wording and remove from the rules those objectionable characteristics which were leading to varied interpretation by different persons.

It was asked that the recommendations should be greatly reduced in bulk and that vague or "specification" matter should be excluded or dealt with separately; and that every attempt should be made to put in a minimum of definite rules, arranged in proper sequence and to be easily read and understood by anyone, down to the wireman's mate.

The Institution was reminded that the rules appeared to have been compiled under the influence of persons who had no interest in anything but complete safety and certainly did not appear to have regarded the value of the wider electrical development or the fact that every electrical appliance replaces some other method intrinsically more dangerous. The author doubts very much whether the most efficient way in which a supply undertaking should run its sales and service department or the best means the industry can find to ensure efficient installation work, have been discovered yet. This paper has not been written with the idea of laying down the law on the subject, but rather is intended to ventilate some of the difficulties in the hope that the discussion may lead to further progress.

Discussion.

Mr. F. W. PURSE (West Ham) said that the author had used the word "curb-stoner" with regard to certain contractors, but he could not help feeling that the paper itself was a "curb-stoner." It was one per cent. grain and 99 per cent. chaff. Whilst the author had said that he did not wish to be understood as condemning wiring contractors, yet he seemed to be doing so all through the paper for he repeatedly called them "curb-stoners" and little-minded men. Again, he said that municipal authorities must have full wiring powers and that wiring contractors had grown up as a separate part of the business. Surely all this indicated that the author was condemning wir-

ing contractors. Then it was stated that the primary object of the contractor was to make a profit. Did not Mr. Robinson wish to make a profit? Surely the answer to Mr. Robinson's own criticisms of the contractor was the I.E.E. Wiring Rules, and yet he condemned the wiring rules also. The object of the Institution wiring rules was to improve the standard of work of which Mr. Robinson complained. On the wiring rules he would have something to say later. He would remind Mr. Robinson also that contractors were represented on the Wiring-Rules Committee. The paper, too, contained many contradictions, such, for instance as saying that the municipal electric supply authorities should work through contractors and then asking for full wiring powers for the municipalities. Then Mr. Robinson was quite wrong in saying that the average cost of wiring an installation was £25 per kW installed. It all depended upon the basis. If one took 40-W points, as Mr. Robinson did, it might be £25, but if one took 200-W points it would be £2. It was possible, of course, to work the figure up to £100, and it was a pity that in an engineering paper the figure of £25 should have been put forward. (Mr. Purse was proceeding to deal with the Institution wiring rules, but the President could not allow him any more time.)

Mr. S. E. FEDDEN (Sheffield) expressed regret that the opener of the discussion had not dealt with it in a broad way but had rather made it a personal attack on Mr. Robinson. After all, these meetings were held to endeavour to find the best way of securing the greatest good for the undertakings, consumers and ratepayers, and the really important point was whether full wiring powers should be granted to municipalities. He had full wiring powers in Sheffield, with a few restrictions, and his view was that if all municipal undertakings had full wiring powers, the supply industry could be developed in a manner not otherwise possible; moreover, the possession of such powers by the undertakings would benefit the contractors because the more energy that was sold the more wiring and installation work would have to be carried out. In Sheffield there were hundreds of contractors who were busy and doing an enormous amount of work and his own idea was that the Association should pass a resolution urging the Government to pass legislation which would give full wiring powers to the municipal electric supply authorities. Why should the gas and electric supply companies have these powers and the municipal electric supply authorities be placed at the disadvantage of not having them? Dealing with the paper, Mr. Fedden expressed the view that they must not expect to make the domestic development work pay at the very start, the profit would come all right later; that was where co-operation between the contractors and the supply authorities would come in. The supply authorities made a good profit on the sale of energy and therefore the installation work should be let out to the contractors on a schedule of prices, because the contractors could not become financially interested in hiring and similar schemes. It was one of the duties of the supply authorities to give service to the consumer and for that purpose he kept a business-getting staff which also dealt with maintenance and repairs, and an emergency staff which would carry out repairs at any time to either factory or domestic installations. During the war the turnover of the department was something like £90,000 per annum although it was not so large now, but a very large amount of business was done with satisfaction to the consumers. In order to introduce electricity into the smaller homes, a rental scheme of wiring was started last year but that did not prove a success. In February of this year he started a slot meter system under which the wiring and fittings were fixed free—the maximum number of lights for each house being fixed at five 40-W gas-filled lamps—and the meter set to give three hours' burning of one lamp for one penny. From February 1st to June 3rd, there had been 1,501 applications and, as the result of experiments, he was convinced that the cheapest and safest form of wiring was wood casing. In this way, the cost of the installation would be paid back in ten years. Applications were coming in at the rate of 100 per week under this scheme.

Miss PARTRIDGE (Exeter), speaking as a contractor, said that too much time was taken up by the contractor in teaching people what they ought to know as to the uses of electricity. If that education of the public was carried out by other means, there would be a more rapid development.

Mr. W. F. T. PINKNEY (Newcastle-on-Tyne Electric Supply Co.) regretted that Mr. Purse did not deal with the wiring rules first because he was looking for some convincing argument in their favour. Personally he did not see any reason for tightening up the 7th Edition and the only argument he had heard so far was that in Ontario the wiring regulations were very much more stringent. Whilst he agreed that the contractors were a weakness in the electric supply business he thought the fault and the remedy lay with the industry itself. The Electrical Contractors' Association was an excellent organisation, but it was weak in numbers and did not have within its membership anything like half the contractors in the country. It was up to the industry to help the contractors strengthen their Association. The "curb-stoners" had been brought into being not through any fault of the Contractors' Association, but because other sections of the industry would trade with anybody who called himself a contractor. Thus it was that we had men without capital and vision and everything should be done to eliminate this type from the industry; manufacturers should refuse to supply this class of man. He himself represented a company which, of course, had full trading powers and he had endeavoured not to start a wiring department of his own. Various methods had been tried of dealing through contractors, and as a result he was now working through a small section of selected contractors and the arrangement worked very smoothly. He was not interested in the question of municipal trading, but as there had been a good deal of opposition to it from contractors all he would say was that whoever supplied the electricity, the contractors should see to it that a vigorous policy was adopted by the supply authority because in that way, as Mr. Fedden had stated, there would be more and more work for the contractors. As an example of policy which might well be adopted in this country, he mentioned that in one large city in the United States the supply authority had put in over 80,000 trial installations in one year on the understanding that they would be taken out if they were not satisfactory, but none was ever taken out. In that city there were 2,300 contractors, all of whom were flourishing.

Mr. WALTER RIGGS (President, E.C.A.) said the general trend of the paper—not to put too fine a point on it—was that whilst contractors were thoroughly bad—with a few exceptions—supply undertakings were thoroughly good. During the past 25 years, tens of thousands of pounds and tens of thousands of man-hours of human effort had been wasted and actually thrown away as far as electrical progress was concerned, as a direct consequence of internal discord and strife within the industry itself. To-day this destructive effort had been almost entirely replaced by constructive work for the common good, and he deprecated any action which would throw us back into the confusion and bitterness of the past. The Electrical Contractors' Association claimed a great deal of credit for the very much improved position of things to-day, and its activities were meeting every day with increased encouragement and success; he gladly acknowledged the ever-growing good-will and support which was being received from manufacturers and others in the industry. A large number of central station engineers had recognised the folly of past discord and had settled down to a process of businesslike, co-operative development carried on in an atmosphere of local electrical peace and stability. To those who were making unsparing efforts on behalf of electrical unity and concord, such a paper as Mr. Robinson's came as a patience-trying ordeal of no small magnitude. Figures had been prepared which showed that those municipal electric supply undertakings which worked through contractors without any trading powers at all had made the greatest progress during the past 12 years, whilst those with full trading powers who were exercising them without contractors had made the least progress. He agreed that live contractors could not be found in districts which were subjected to rate-aided competition or to competition based on the bad business principle that what was lost on the swings of wiring could be made up on the roundabouts of supply. In an atmosphere of competition, opposition and discouragement, live contractors tended to move away to other and better fields, leaving the central station authority in full enjoyment of the remnant of "curbstoners" who were prepared to hang on and live from hand to mouth.

Mr. R. B. MITCHELL (Glasgow) said he would like to put in a plea for the contractor in a small way of business, who, he had found from experience, played a very useful function in the electric supply industry, and who would perform a still more useful function in the future, because there would be such a lot of small installation work to be done. Whilst agreeing that full powers were necessary for municipal undertakings he himself had not yet found it necessary to have an installation staff beyond such as would fulfil the internal requirements of a large Corporation. He had endeavoured to maintain friendly relations with the contractors, and in that he had been quite successful. All the work was done at schedule rates by the contractors, and just as cheaply as if it were done direct. All that was needed was supervision by the department to see that what was specified was actually provided. Having to deal with people with small incomes it was necessary to find a scheme which would come within those incomes, the people who did not own the houses they lived in. Consequently, in Glasgow, he had started, very successfully, a scheme of hire-purchase wiring, the installation work being carried out by contractors, and within a month 150 houses were dealt with; but there were something like 180,000 houses in Glasgow not supplied with electricity so that the field was very large.

Mr. H. MARRYAT (Messrs. Marryat & Place) also spoke in defence of the contractors and suggested that the gas industry would not be in the position it was as regarded getting new business, if it had not eliminated the contractor altogether in the manner it had. It was notable that Mr. Pinkney, representing the largest electric supply company in the country, and Mr. Mitchell, representing one of the largest municipalities, should have found it more satisfactory to work through contractors, and he was also pleased to hear Mr. Mitchell support the small contractor, because the fact that a man was in a small way of business did not mean that he did the work badly. At the same time, nobody had any sympathy with the "jerry" wireman. It must not be forgotten that the electric supply industry had been built up on the work of contractors and even Mr. Robinson did not always have selling powers, yet he had made progress. At the same time, it was necessary for the contractors to have the full support of the supply undertaking. After all, the undertaking reaped many times the revenue and profit from the consumer, brought by a contractor, than the contractor did. It was astounding to see the smallness of the turnover of those departments which did all their own installation work, and there were contractors who could put those figures in the shade. There were several firms in

London who were prepared to send men out at any time of the night and day to do repairs.

Alderman WALKER (Manchester) also supported the policy of working in friendly co-operation with the good contractor and so securing good work. The supply authorities should maintain a central showroom and maintain contact with potential consumers; that was a necessity and saved the contractor a lot of work, and also from having to keep money locked up in stock. At the same time he thought there should be some contribution in some form from the contractors towards the upkeep of these showrooms by way, perhaps, of a lower discount, than the full trade discount when sales of apparatus were effected. It did not seem to him fair that the supply authorities should maintain these showrooms altogether at their own expense and he was proposing to make some such suggestion to the contractors in Manchester with whom the department worked in perfect harmony. On the general question, he believed there was room for the contractor in the industry and that every endeavour should be made to eliminate bad work. As an instance of the enormous field for development, he stated that in Manchester, out of a sale of 240 million kWh, only 13.4 per cent. went for lighting and domestic power. The difficulty in Manchester was that up to two years ago the industrial power load came on at such a rate that it was impossible to do much with the domestic side but now that the new power station was at work that position was altered. In criticising the new wiring rules, the question to be answered was what was the extra cost of working under the 8th edition as compared with the 7th edition? It was very small indeed, and that was the test, and we ought to have the installation work done in a permanent and satisfactory way and not in a makeshift manner.

Mr. A. H. SHAW (Ilford) said that Ilford only had hiring powers but he had been working amicably with the contractors. Many hundreds of installations had been carried out in this way and he had never been called in for maintenance. At the same time, there was a very large amount of work to be done on hire-purchase which, however, he could not touch until he had the full powers. He also expressed the hope that it would not be thought that a small contractor was necessarily a bad one. As to the I.E.E. wiring rules, they contained the names of various Associations as having adopted them, including the I.M.E.A. He wished to know whether the names of those Associations were carried from one edition of the rules to another irrespective of whether alterations were made which were not approved by those bodies; in short, had the I.M.E.A. adopted the 8th edition of the rules? Personally, he agreed with Mr. Robinson that there was no reason to alter the old rules as to flexibles. The chief trouble had been with the connector to the piece of apparatus. He did not agree that adaptors should be cut out entirely as they were an extremely useful piece of apparatus in certain cases. The relative cost of working under the two editions of the Rules had nothing to do with the matter, in his opinion. It seemed rather that the "Safety First" microbe was at work and that the I.E.E. Wiring Rules Committee had put in every safety-first device imaginable regardless of expense.

Mr. J. W. BEAUCHAMP (Electrical Development Association) suggested that sufficient use was not being made at the present time of the existing contractors' organisations as centres of contact with the consumer. For instance, if a contractor showed in his shop window the hiring terms of the supply department, it helped to maintain contact with the public. It all helped to keep the main idea of the use of electricity in the mind of the public. Whilst there were many contractors who were fully alive to this aspect, there were a still larger number who were not and there were many matters in this connection which should be discussed between the departments and the contractors. Much more local work of this character was necessary. Another thing which might be done was on the lines of the "Red-Seal" plan in America, to indicate whether a house or premises were correctly lighted, &c. There might be some method of attaching a seal to the specification so that houses and premises would be wired according to specification "A" and so on, according to the completeness of the installation. Then the contractors might be given a bonus or some encouragement to get the houses wired on a higher grade of completeness. Perhaps there might be a Committee on the relations between contractors and undertakings, when full trading powers were secured.

Councillor HENNESSEY (Bristol) protested that at a meeting of municipal engineers and councillors, speaker after speaker should come on to the platform and support the contractor. He thought the time had come when it should be said that those who represented private firms should not be allowed to attend the Conferences. As a Socialist, he held the view that the undertakings should be run solely by the municipalities without the intervention of contractors. The sort of thing that had happened at the hands of contractors in Bristol was that rows of houses were wired and the occupants paid for the installation and then found they were a mile away from a supply cable.

Mr. A. H. DYKES (Beckenham) suggested that it should be appreciated that the paper had deliberately been written in a provocative form and that it would be well not to take seriously everything that was in it. The great point which Mr. Robinson was endeavouring to drive home was that mere reductions in price of electricity were not enough to bring about development of the use of electricity. Beckenham had full wiring powers and now worked through contractors, although a certain amount of work was done by the department. He agreed that every municipality should have full wiring powers, although it did not follow that the work would not be put through contractors. Full wiring powers were certainly necessary if small houses were to be dealt with. On this latter point two methods which had been successful, and he had introduced, were the current limiter and the fixed price light system. The latter was now being taken up by certain companies whom he advised in India, for bazaar lighting. Dealing with the wiring rules, as a one-time member of the Wiring Rules Committee he thought the Committee had fallen between two stools in bringing out the 8th Edition. It would have been better to have made the rules a code to which everyone should try to work rather than a sort of manual to which every wireman was expected to conform. They were too complicated for the ordinary wireman to understand. The difficult thing was to say that an installation which did not comply with the rules was wrong and that was why he thought it would have been better to have regarded the rules as a code for the best class of work. There could then have been a few shorter necessary rules which would have made it easier for the contractor. From his experience, the chairman of the Committee, in an endeavour to be very fair, allowed various fads of members of the Committee to be incorporated, and so it was that we had precautions against all sorts of contingencies which might or might not arise. An instance of the difficulties involved was that of a large house the wiring of which contravened practically every rule in the 8th Edition. The fire insurance company concerned was mentioned as one of those who had adopted the rules and yet when he inquired, he was told that the fire insurance company was going to pass the installation because if it did not some other company would.

Mr. J. R. DICK (W. Lucy & Co.) suggested that if the wiring rules were called "British standards for electrical installations," Mr. Robinson would fall in love with them. The difference in the cost of complying with the 8th Edition as compared with the 7th Edition of the wiring rules was not large enough to warrant the pessimistic attitude taken up by Mr. Robinson.

Mr. Robinson, who will give his full reply later, reiterated that his remarks with regard to contractors were not intended to be offensive, although they appeared to have been so taken in certain quarters. East London, however, suffered from a type of man whom, as a contractor, none of those present would care to associate with. The most important point was the question of municipal electric supply departments having full wiring powers, and no contractor need fear that these wiring powers would be put into operation by municipalities direct. They had heard of the municipalities who had found it advantageous to work through contractors, and they had also heard from Mr. Shaw, of Ilford, that he had not developed in the way he could—and he worked through contractors—because he had not full wiring powers; therefore, it would be to the advantage of the contractors if the municipalities had full wiring powers. He appealed to contractors to alter their policy of opposition and to assist the municipalities to obtain those powers in order that hire-purchase schemes could be put into operation. In Hackney at first they worked entirely through contractors; then they tried another method but had come back to working through contractors on the basis of a schedule of prices and specifications which had been drawn up in co-operation between the contractors and himself. He wished to put it perfectly plainly to contractors that municipal electric supply departments with full wiring powers would maintain small staffs for their own internal requirements and repair and emergency work, but the contractors would lose nothing by that. As to the wiring rules, he agreed that the difference in cost between the 7th and 8th editions was not much if only lighting were considered, but it would be considerable when radiators and other apparatus were fitted.

Annual General Meeting.

The Annual General Meeting was held on Friday, June 19th, in the Dome, the President in the chair.

It was announced that Mr. R. B. Mitchell (engineer, Glasgow), had been elected President for the coming year. Mr. MITCHELL expressed his thanks, as did Dr. DEWAR (Glasgow), who at the same time extended a cordial welcome to the Association to hold the 1926 Convention in Glasgow.

Mr. R. W. L. PHILLIPS (Bedford) was elected Vice-President.

The Annual Report of the Council was then presented, arising out of which a few matters were discussed.

The Report stated that the total membership stood at 217, representing 83 per cent. of the authorities eligible. The bulk of the Report related to the activities of numerous Committees of the Association, and of other bodies with which it was in collaboration. A statement had been sent to the Electricity Commissioners recommending, *inter alia*, that the coal consumption statistics which they published annually should be based upon the units delivered to the feeders and not upon units generated, and that the annual station load factor should be given. The possibility of using wireless communication between the power station and repair gangs, &c., was being investigated. The National Register of Electrical Installation contractors was commended to the members for their support. The Electric Vehicle Committee of Great Britain was about to be amalgamated with the Electrical Development Association. A report had been submitted to the Electricity Commissioners with regard to the development of electricity supply areas, containing a number of recommendations relating to generation,

transmission, and distribution, and to the extension of the scope of fringe orders. The Association had pressed upon the B.E.S.A. the desirability of adopting 250 V as the standard voltage of supply, but the decision was in favour of 230 V. Approval was expressed of the Illumination Design Courses organised by the E.L.M.A., as adding to the efficiency of salesmen, and the importance of contributing to the funds of the Electrical Research Association was emphasised, a scale of subscription based upon output being put forward for the guidance of electricity supply committees.

The accounts showed that the income for the year was £2,449, and the expenditure £2,280, leaving a surplus of £169. The balance sheet recorded a surplus of assets over liabilities of £2,518.

E.D.A. Subscriptions.—Councillor GOUGH (Cardiff), asked for expressions of opinions with regard to the new scale of subscriptions to the E.D.A., *viz.*, one-tenth of one per cent. of the revenue of the undertaking. Whilst he himself supported the new scale he was having difficulties with some of his committeemen. In the case of Cardiff it meant an increase in the subscription from £60 to £120.

The PRESIDENT said that strictly this was not a matter for the I.M.E.A. at all, but for the individual undertakings to make up their minds about. The I.M.E.A. Council merely recommended that the new scale should be adopted.

Councillor MCLEOD (Hull) expressed the view that if the money was for propaganda, not many councils would agree. If it were for research it was another matter. Councillor PEARLMAN (Hull) said that in the case of Hull the subscription would be increased from £60 to £300 and he thought the meeting should give a decision as to whether the new scale should be adopted. Mr. J. CHRISTIE (Brighton) said his subscription would be increased from £59 to £200, but every penny of the money would be well spent. Alderman WALKER (Manchester), said there would also be a considerable increase in the subscription from Manchester, but he supported the scheme fully.

Calorific Value of Coal.—On the motion of Alderman WALKER (Manchester), seconded by Councillor HAMMER (Hackney), a resolution was passed that an endeavour be made to secure direct representation for the I.M.E.A. on the Joint Committee formed by the Institutions of Civil, Mechanical, and Electrical Engineers, to deal with the question of moisture in coal and a test for calorific value. Certain work was done as the result of Mr. Miles's paper last year on "Power House Chemistry," but it had been abandoned in consequence of the appointment of the committee mentioned. It was felt by the meeting that the I.M.E.A. should have direct representation, although Mr. R. A. Chattock was on the committee representing the Institution of Electrical Engineers.

Standard Voltage.—The Council reported, in connection with the proposal of the B.E.S.A. that the standard voltage should be 230 volts, that it had passed a resolution that 250 volts was the more desirable figure. Mr. N. STANILAND (Hornsey) moved that the Council's resolution be confirmed, but the proposal was rejected by a large majority, the general opinion being that the standard voltage should be 230 volts. The hon. secretary intimated that the resolution in favour of 250 volts carried by the Council was not unanimous.

The Annual Report was then adopted.

Wiring Powers.—A long and lively discussion took place upon a resolution moved by Councillor THICKETT (Grimsby), instructing the Council to take steps to secure legislation which would give full wiring powers to all municipal electricity supply authorities. A long and detailed amendment to this was sent in by the representatives of Hackney, which Councillor Thickett said he was prepared to adopt. This amendment, in fact, set out the wiring clause in the Woolwich Act of some 20 years ago, and instructed the Council to take the necessary steps to make this general to all municipal authorities.

Strong objection was taken to the Hackney amendment by a large number of those present, on the ground that it would tie the hands of the various authorities to a particular form of wording which they had not had an opportunity of considering. Others preferred the original Grimsby resolution, which left the matter in the hands of the Council to a large extent. Various other amendments were proposed and objected to, including a proposition that the matter should simply be left in the hands of the Council to deal with.

Eventually, the Grimsby resolution, with certain modifications, was passed in the following form:—

"That this Association consider the advisability of initiating legislation giving powers to municipal electricity undertakings to sell and install on the hire-purchase system or otherwise, electrical apparatus, such as cookers, stoves, &c., and also powers enabling such undertakings to finance and carry out through wiring contractors or otherwise, wiring installations, and to charge a rent in respect of such wiring installations, or recover the cost thereof on the hire-purchase system or otherwise."

Assessment of Electricity Undertakings.—A proposal was made on behalf of the Watford electricity undertaking that the matter of the increased assessments of electricity undertakings should be referred to a special committee, and this was agreed to.

Expenses of Members of Council.—On the motion of the delegates from Barrow-in-Furness, the desirability of making arrangements to pay the expenses of members of council was referred to the Council for consideration.

Bulk Supplies.—The Gillingham Corporation proposed that the matter of safeguarding the interests of those authorities taking bulk supplies be considered by the Council, and this was agreed to.

Joint Boards and Membership.—It was agreed to instruct the Council to take the necessary steps to alter the Articles of Association so as to admit to membership of the I.M.E.A. Joint Electricity Boards composed entirely of local authorities.

Chairmen's Meeting.—A resolution from the meeting of chairmen held on June 16th, recommending that the chairmen's meeting in future be a permanent part of the Convention proceedings and not an informal meeting was confirmed.

The usual votes of thanks to those who had assisted in the Convention arrangements closed the annual meeting.

(To be continued.)

The National Physical Laboratory.

Annual Inspection by the General Board.

THE annual inspection of the National Physical Laboratory by the General Board took place on June 23rd. On the arrival of Sir C. Sherrington, President of the Royal Society, with Lord Rayleigh and other guests at the new lodge, the director of the laboratory, Sir J. E. Petavel, invited the president to perform the ceremony of opening the Queen's Road entrance. The guests were addressed by the president and Lord Rayleigh, the former then receiving a special key from Sir L. Earle, secretary, H.M. Office of Works, with which he opened the gates; and he then declared the new roads open.

The new road scheme was undertaken as the first necessity in the development of additional land that was acquired in 1920 to meet the growth of the laboratory, which has been continuous since its foundation 25 years ago. The scheme offered an opportunity of improving the approaches to existing buildings and convenient access has been provided to the Admiralty Research Laboratory, to the new laboratory recently erected to meet the needs of the Chemistry Co-ordinating Research Board, and to other buildings on the new site.

Tea was provided during the afternoon, and in the course of their tour of the various departments numerous experiments were watched and apparatus examined by the visitors.

In the Aerodynamics Department the electrically-heated wire method of measuring rapidly fluctuating wind velocities is employed. The experimental difficulties are accentuated by the fact that anemometers of normal design are subject to a "lag" and cannot follow the variations of speed sufficiently faithfully, but with the finest platinum wires, one-thousandth of an inch in diameter, 2 or 3 fluctuations per second are faithfully recorded; even with instruments designed as carefully as this a pronounced lag is experienced for more rapid variations of speed. A full understanding of the laws which govern air flow claims first importance in aeronautical research. The investigation of those complicated problems is facilitated by a device known as the electrical tank. Its application is based upon the fact that air flow patterns in theory have features in common with an electrical field. The rectangular tank (5 ft. long and 2½ ft. wide) is filled with slightly acidulated water, and an alternating current of audio-frequency is passed between thin metal plates mounted on the two longer walls of the tank. The model to be studied (*e.g.*, an aeroplane wing), is fixed with its span vertical in the centre of the tank, and observations are made on the resultant electric field, for which purpose two exploring electrodes are used, connected to a 3-valve low-frequency amplifier. The observer is provided with headphones, and one electrode is moved until no sound can be heard. With the use of linkage attached to the moving electrode, the field is readily mapped on paper and the curves obtained are compared with the actual air pattern as determined in the wind-tunnel.

In the Metrology Department, amongst a variety of exhibits dealing with precision measurement, was an example of length measurement by means of the interferometer. A new form of cadmium lamp, recently invented by M. Hamy, was also shown; the waves of red light from the lamp are used as a fundamental unit by which all other light waves are measured and their extreme smallness may be realised from the fact that there are nearly 1½ million waves of red light in a yard. A method of depositing a film (from 1 to 2 millionths of an inch thick) of silver upon glass is to pass an electrical discharge through a vacuum chamber having a silver electrode, in the neighbourhood of which lies the glass to be silvered. The silvered-glass plates are used in interferometry methods of measurement.

In the Electrotechnics Department the new standard power-measuring apparatus includes a new precision electrostatic wattmeter. The standard type of instrument used for measuring the amount of power in an alternating circuit has been re-designed in detail, and a new one constructed to supplement that which has been in use for some years. The equipment includes very accurate voltmeters, all the instruments indicating the values of the quantities on a circular scale about 21 ft. long. These instruments are used for determining the corrections to be applied to instruments used for important measurements of power throughout the country, including instruments for adjusting ordinary domestic meters. It is important in many tests to maintain the frequency of the current, when testing instruments for use on alternating circuits, very accurately at the value at which they are to be used.

A special three-phase alternator has been attached directly to the shaft of the main machine; this alternator is connected directly to a special synchronous motor, which may be placed in the locality where it is desired that the speed should be indicated. It carries a ground glass disk on which a pattern is marked in black; the disk is illuminated from behind by flashes of light from a neon tube, which are of very short duration and produced by the motion of an accurately adjusted tuning fork, kept automatically vibrating on the electric bell principle. If a suitable repeating pattern depending on the speed is marked on the disk it can be made to appear to be at rest for certain particular frequencies, such as 50 cycles per second, when illuminated in the manner described. If the speed differs slightly from the proper value, the pattern appears to rotate slowly backwards or forwards. The whole arrangement requires no attention on starting up the main machine other than starting the tuning fork, the motor driving the rotating disk being self-synchronising.

The effect of an electric field on the operation of a thermionic valve was demonstrated with the aid of a metal plate, electrified by a battery and fixed on a pendulum which was made to swing past a fixed plate attached to the grid of a valve. Every time the pendulum approached the conductor connected with the grid it caused a variation in the current flowing in the anode circuit of the valve. The variation may be either an increase or decrease according to the polarity of the charge of the swinging plate, and the effect may be amplified by valves in cascade, so that either small movements of the plate or small voltages can be made to produce a measurable indication.

During an investigation to determine the most suitable methods of making electrical earth connections, interesting effects of the movement of moisture with the passage of a small current were obtained, and the special d.c. generator (giving 5,000 volts) has been used for testing specially impregnated timber used for protecting railway track workers from accidental contact with live rails.

The high value of land in congested areas often imposes upon architects restrictions of the severest nature as regards the provision of daylight in large block buildings. It has been estimated that the cost of daylight for such a building on a valuable site may be as much as £4 or £5 per annum for each room. Experimental work on the subject is being carried on in the Photometric Division of the laboratory.

In the Physics Department, in connection with sound-wave photography, a single spherical sound pulse is produced by the passage of an electric spark across a short gap and by means of a second illuminating spark gap activated after a suitable time interval the shadow of the pulse can be photographed. This method can be used for testing the acoustic properties of buildings by the use of sectional models.

Work has been done on determining the best manner in which to set diamonds which are used as pivots in various scientific instruments. The direction of the cleavage planes of the diamond with reference to the bearing surface has been found to be of great importance. In the Metallurgy Department there was seen what is perhaps the finest equipment for the experimental study of metals to be found anywhere in the world.

While the foregoing are but a few of the 180 items to which special attention was directed, they will serve to indicate the all-important role of the laboratory and its competent staff in the advancement of science and its application to national and industrial problems.

New Electrical Devices, Fittings, and Plant.

(Readers are invited to submit particulars of new or improved devices and apparatus.)

The Thermofan.

The accompanying illustration, fig. 1, shows one of the latest products of MESSRS. MATTHEWS & YATES, LTD., Swinton, Manchester, the cyclone patent thermofan. This device comprises a fan, intended to be coupled to a steam turbine, and an air heating element through which the exhausted steam from the turbine is passed, the heated air being circulated by the fan, thus providing an economical supply of heated air. This unique machine is claimed to be suitable for plenum heating, laundry work and drying by hot air, or for any other process where a large volume of warm air is required.

Fig. 1.—The Thermofan.

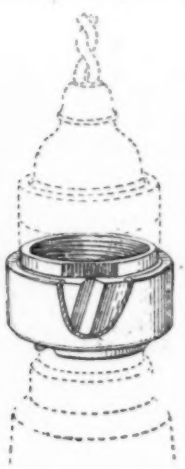


Fig. 2.—The "L.P." Electric Lamp Lock.

A New Electric Lamp Lock.

We illustrate herewith, in fig. 2, the "L.P." lamp lock, a device designed to prevent the removal of electric lamps by unauthorised persons, which is about to be marketed by MESSRS. G. P. PECKHAM & Co., 4-5, New Compton Street, Charing Cross Road, London, W.C.2. The device comprises two rings, inner and outer, with a one-way clutch between them, so that the inner ring may be turned by rotating the outer ring in one direction, due to the engagement of the clutch; but the free-wheel action of the clutch prevents this dual action in the opposite direction. The inner ring is threaded so as to engage with the lamp holder. The lock is first placed over the lamp cap, and the lamp fixed in the holder in the usual manner. The inner ring is then engaged with the lamp holder, an internal flange at the bottom locking the lamp by engaging with the lamp pins projecting from the slots in the holder. An additional lock is provided for the inner ring by means of the shade carrier ring of the holder. To release the lamp the inner ring is unscrewed by means of a special key which is fitted to the upper edge of the inner ring projecting above the outer ring, by means of two flattened milled sides.

Constant-Peripheral-Speed Electric Grinder.

The accompanying illustration, fig. 3, is of a double-end electric grinding machine, which, according to *American Machinist*, will maintain a constant peripheral grinding speed regardless of the wheel diameter. The machine is marketed by the UNITED STATES ELECTRICAL TOOL CO., 2,488, West Sixth Street, Cincinnati, Ohio. The wheel guards are mounted on gibs which are moved back as the wheel wears down. The gibs are attached to a speed controller so as to operate the controller, when displaced due to wear on the wheel, to such an extent that the motor speed is varied sufficiently only to

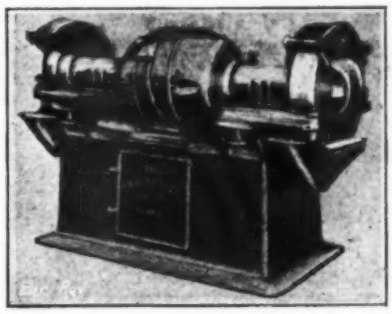


Fig. 3.—Constant-Peripheral-Speed Grinder.

maintain a constant peripheral speed on the grind wheel. The motor is totally enclosed and the bearings throughout are of the S.K.F. heavy-duty type.

Device for Testing Wire Wheels.

The diagram in fig. 4 illustrates the method employed for electrically testing wire wheels, to determine if the rims run true, by means of a device described in *Machinery*. The testing machine is built up on a frame A, from which an adjustable pin B projects to accommodate wheels of different diameters. The wheel C revolves on the pin so that the rim, if out of true, will make contact with one or both of the contact pins H during one revolution. These contact pins are held in and insulated from steel containers. The pins are connected in circuit

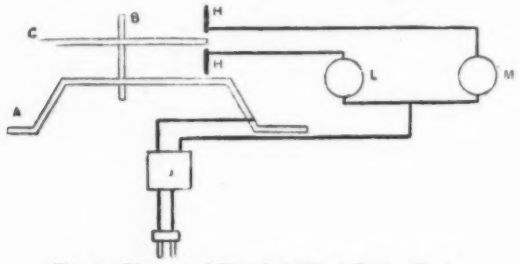


Fig. 4.—Diagram of Electrical Wheel Testing Device.

with two lamps L and M, a transformer J (decreasing supply pressure), and the framework of the device, to a source of supply in such a way that contact between the top or bottom of the rim and the top or bottom contact pin will light one of the lamps accordingly. One revolution of the wheel is sufficient to determine if it is accurate within the required limits. In the case of wheels that do not pass inspection, the single revolution on the testing machine serves to mark the rim in such a way that the workmen will know exactly where trueing up is required.

New Insulation for Leadless Cables.

We have received from HOMOGENEOUS CABLES, LTD., 43, Stadhoudersplein, The Hague, some particulars of two of their recent products, a new insulation "Karetnja," and leadless cables insulated with this product. "Karetnja" is a kind of bitumastic material, invented by Mr. Ali Cohen, the inventor of "Liconite." The makers claim that "Karetnja" is impermeable to water and possesses excellent electrical qualities, and that cables insulated with it can be used quite safely without lead sheathing.

The material is made in two forms, one for insulating the cores of cables, and one for use as outside sheathing. The inside insulation is somewhat softer than the outside sheathing, and it becomes slightly plastic at 100 deg. C., but still retains its elasticity and capacity for bending. It is also claimed that microscopic examination of the sheathing bent round a cylinder having a diameter of only three times the thickness of the material, fails to reveal any change in the state of the material. The use of this insulation renders cables extremely light; a 3 by 16 sq. mm. 10,000-V cable is said to have a weight of 1.7 kilo-gm. per metre.

Provision against mechanical damage is made by the use of a jute braiding applied over the sheathing. It is further claimed that the material is immune from the action of dilute acids, alkalis, oils, &c.

In order to avoid the possibility of the existence of electrostatic and electromagnetic fields on the "Karetnja" sheaths in the absence of metallic sheaths, the makers suggest a certain simple method of manufacture which does not appreciably alter the cost or weight of the cable.

Pressure tests on samples of the material 1.07 mm. thick, show a mean rupturing pressure of 38 kV, and on samples 10.0 mm. thick, 105 kV.

Tests on the cable after 24 hours' immersion in water show 0.72 per cent. dielectric loss on a 30 kV cable, insulation resistance per km. at 15 deg. C., 750 megohms, and the dielectric constant induce capacity in microfarads per km. at 15 deg. C., 0.394. The tests were repeated and the same results obtained 28 days after the immersion in water.

The New "Mazda House."

A FEW weeks ago we announced the opening of new showrooms at "Mazda House," Newman Street, W.1, by the British Thomson-Houston Co., Ltd. These are now in full working order and we recently had an opportunity of inspecting them. The new "Mazda House" is in an excellent position in one of the principal West End thoroughfares and is thus well served by omnibuses, &c.

The main showroom, part of which is shown in fig. 1, is a commodious one running the whole length of the building, and a very large selection of lighting fittings is displayed in a tasteful manner. Off the main body of the room are three small rooms arranged as a bedroom, dining room and study, each with appropriate lighting. In addition, there is a series of alcoves (fig. 2), in which the effects of any selected fitting can be demonstrated. By an ingenious bayonet type of ceiling fitting, combined with a pull switch, any lighting fitting can be readily taken down for separate demonstration or sale. On the ground floor other lighting fittings, more of the "utility" type, are shown. Here also is a collection of domestic heating, cooking, and labour-saving devices. Adjacent to this is a

Fig. 1.—A Part of the Main Showroom.

room set aside for the demonstration of "Tungar" rectifiers, a washing machine, a cooker, and exhaust fans. The lower ground floor is devoted principally to commercial and industrial lighting, one of the most attractive features being two shop windows which are placed at the disposal of firms who

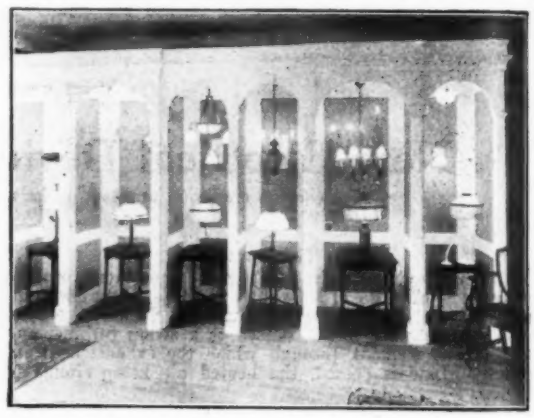


Fig. 2.—Alcoves for Demonstrating Individual Fittings.

require special arrangements for illuminating their goods with coloured light. There are also "Posterlite" fittings, projectors, and office and works lighting units. Radio apparatus of all kinds is also displayed on this floor. The two upper floors are devoted to offices, among which is the Lighting Service Department, in which fittings are designed in accordance with customers' special requirements. The Newman Street entrance is flanked by well-arranged display windows which give the exterior an attractive appearance. A rear entrance leads to a trade counter (fig. 3) which is arranged for rapid and efficient service.

Fig. 3.—Trade Counter.

Selected Radio-Telephone Apparatus.

Recent Developments and Improvements.

The Marconi-Osram DE3B Valve.

The resistance-capacity method of inter-valve coupling possesses several important advantages, namely, distortion effects due to transformer losses are entirely eliminated, amplification is practically independent of the frequency over the entire range of speech frequencies, and the h.p. current consumption is low. The main disadvantage, however, is its low amplifying power, and, as the step-up must be performed by the valve, the latter should have a high amplification factor combined with low impedance. To meet these conditions, the Marconi-Osram DE5B valve has been designed with an amplification factor of 20 and an impedance of 30,000 ohms. Introduced several months ago, it has met with success not only as a resistance-coupled amplifier, but also when performing other functions, but although the current consumption is only 0.25 amp. the use of a number of these valves in multi-stage amplifiers, such as the supersonic heterodyne receiver, would result in a considerable demand on the accumulator. To overcome this disadvantage, the M.O. Valve Co., Ltd., has introduced a new valve, known as the DE3B 0.06-amp. type, operating at the same filament voltage (2.8), but having a much

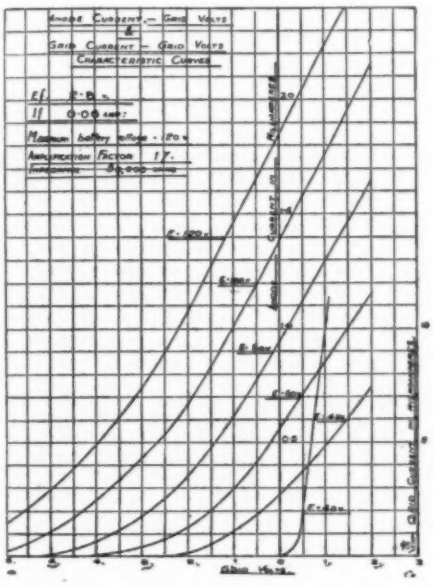


Fig. 1.—Characteristic Curves; Marconi-Osram DE3B Valve.

higher voltage amplification factor than the DE3 type; it has been found possible to design this valve with an amplification factor of 15, and still retain the comparatively low impedance of 50,000 ohms. It follows, therefore, that while the DE5B pattern remains the better valve from the point of view of characteristics, the economical operation of the DE3B type will commend its adoption in many cases. The characteristic curve, fig. 1, indicates that the DE3B valve can deal with a grid swing of about 2 volts at 120 h.p. volts, without working round the bottom bend, as the plate current characteristic is straight to a negative value of about 4 grid volts.

Thus, with the maximum h.p. voltage allowable (120), the DE3B type provides volume without distortion up to two stages of audio-frequency resistance coupling, using a negative grid bias of 1½ volts; for the last stage a DE3 valve may be used, but, if very strong signals are being received, type DE4 should be substituted. As a h.f. and detector valve, the DE3B will give better results than the DE3 type on weak signals, and it detects the short waves from KDKA (68 metres) well when followed by a DE3 as a l.f. amplifier. The DE3B is unsuitable for operating as a transformer coupled l.f. valve, as its impedance is too high for this purpose.

The "Acme" Filament Resistance.

The new filament rheostat illustrated in fig. 2, which is made by the Acme Production Co., Ltd., is of an original design. Its feature is the contact, which is of a roller type, secured to a phosphor bronze spring, thus avoiding the conventional method of rubbing contacts and giving a constant pressure on the inner surface of the resistance. By this design smooth control is combined with silent operation and the maximum gradation of the resistance without the use of any fine adjustment. These rheostats are made for one hole fixing and are stocked in 15- and 30-ohm sizes suitable for either bright or dull-emitter valves, and are complete with knob and pointer. There are no complicated parts to get out of order and the workmanship is good.

A New Porcelain Insulator.

In view of the fact that porcelain insulators have hitherto always been used in compression, the example illustrated in fig. 3 is of interest because it will actually withstand a direct pull of several hundred pounds quite safely. It is known as the "Climax low-loss" insulator, and its makers claim that it will stand four times the flash-over voltage of the ordinary shell, or egg, type, and has far less capacity to earth. It is made of the same vitreous porcelain as 100,000-V insulators for transmission lines, and is non-hygroscopic. It is a product of Climax Patents, Ltd.

The Mullard S.6 Valve.

The S.6 pattern is a dull-filament valve designed by the Mullard Radio Valve Co., Ltd., primarily for "anode bend" rectification. In this method advantage is taken of the curvature of the lower part of the anode current-grid voltage curve, whereby h.f. oscillation on the grid causes an increase

Fig. 2.—The New "Acme" Filament Rheostat.

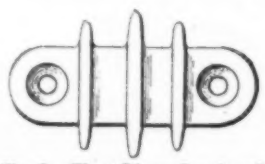


Fig. 3.—The "Climax Low-Loss" Insulator.

Fig. 4.—The Mullard "S.6" Valve.

in the mean anode current. It is important for this purpose that the characteristics of individual valves should not vary to any considerable extent from the accepted standard, and S.6 valves all meet this condition, it is claimed. Their amplification factor (22) and impedance (100,000 ohms) are high, and they can be used with success as h.f. amplifiers and as resistance-capacity coupled amplifiers. In the latter case a h.p. voltage of from 150 to 200 volts is recommended with an anode resistance of from 100,000 to 200,000 ohms. A filament current of 0.2 amp. at 3 volts should not be exceeded, and an important feature of these valves, one of which is shown in fig. 4, is the helmet-shaped moulded cap which yields low inter-electrode capacity. The valve occupies small space and fits standard anti-capacity clips.

"Lilliput" Headphones.

Under the above name new headphones have been introduced by the Sterling Telephone and Electric Co., Ltd., to meet the demand for reliable instruments for general radio use. The magnets are made of tungsten steel, and the bobbins are carefully wound with best-quality wire and impregnated to prevent any possibility of corrosion. The gap between the Stalloy diaphragm and the pole-pieces is adjusted by grinding the pole-pieces. The headband is made of springy steel wire covered for its greater part with leather; adjustment to the head is easy. These 'phones, including the cords, which are totally enclosed, weigh 9½ oz., and the sample sent us gave good results and was found to be very comfortable in use.

New "Excel" Clips.

We have received from Messrs. S. H. Collett samples of some new saw-tooth jaw clips which are of general utility for making temporary connections. One of their points of advantage is the fact that the neck has been made of such a size as to accommodate any size of cable, or flexible, or a number of wires as may be required.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

The Mersey Tunnel Bill.—On June 24th and succeeding days, having heard the case for the promoters of this Bill, the Select Committee of the House of Lords commenced to hear the evidence on behalf of the opposition.

Mr. MONCRIEFF, K.C., who represented the Mersey Railway Company, said that although there was at times great congestion at the riverside, there was no justification for such a costly scheme as was proposed, which would seriously interfere with the business of existing transport undertakings.

Mr. J. FALCONER, chairman of the Mersey Railway Company, said that his undertaking had had a great struggle in the past but was now proceeding towards prosperity. If the tunnel were sanctioned it would be very detrimental to the company.

Similar evidence was given by other witnesses. The proceedings concluded on June 30th, and the Committee signified its approval of the Bill.

Electric Lighting on Railways.—On June 22nd, Colonel DAY asked the Minister of Transport whether he was aware that many carriages on the Southern Railway, Brighton Railway section, were rendered objectionable by obnoxious gas fumes, due to leaking gas containers under the carriages; and would he make representations to the company suggesting that in the interests of public safety these carriages be electrically illuminated.

Col. ASHLEY said it was a recommendation of his Department that all new or reconstructed passenger stock should be electrically lighted, and the Southern Railway Company had adopted this practice. The company stated that any case of leakage which might be brought to its notice would receive immediate attention.

Wireless Aerials.—On June 22nd, Sir K. WOOD, Parliamentary Secretary to the Ministry of Health, informed Rear-Admiral Beamish that no objection had been raised by the Ministry to the erection of wireless aerials on State-aided housing schemes provided that the usual precautions were taken for the proper earthing of the installation.

Telephone Deposits.—On June 22nd, Sir W. MITCHELL-THOMSON, the Postmaster-General, informed Mr. W. Thorne that the minimum telephone deposit had been reduced to £1 and those subscribers who had deposited £1 10s. would be THOMSON, the Postmaster-General, informed Mr. W. Thorne credited with 10s. through the accounts to be rendered in July, except in cases where the charge for the quarter's calls appreciably exceeded £1 10s.

Wireless at Sea.—On June 25th, Sir P. CUNLIFFE-LISTER, President of the Board of Trade, informed Mr. B. Smith that representations were made some time ago to the Board of Trade and the General Post Office that, owing to the small field for training wireless operators at sea, great difficulty was being experienced in complying with the requirement that operators in charge of a ship must have had 12 months' sea service; and that unless some action were taken to amend the rules, there would soon be a serious shortage of experienced men available for the sea service. The matter was very fully discussed by the Board of Trade and the Post Office with representatives of the wireless telegraphy companies, the shipowners and the Association of Wireless and Cable Telegraphists. As a result of these discussions, the Board and the Post Office came to the conclusion that it was advisable to reduce the requirement to six months' service.

Gas Companies and Electricity.—On June 26th, in the House of Lords, LORD RAGLAN moved the second reading of the Statutory Gas Companies (Electricity Supply Powers) Bill, which enables statutory gas companies to apply for Special Orders under the Electricity (Supply) Acts to empower them to apply their funds or to borrow money for electricity purposes.

LORD BANBURY opposed the Bill, contending that it took from Parliament powers which it had exercised almost from time immemorial and bestowed them on the Electricity Commissioners, who were practically responsible to no one, and the future composition of whose body no one knew. The Commissioners would be able to grant concessions which had a pecuniary value and that power might lead to corruption. The Bill also enabled the Commissioners to grant powers to gas companies in areas in which electricity companies had already got powers and were subject to statutory obligations.

LORD DONOUGHMORE, Chairman of Committees, pointed out that these Special Orders remained subject to the control of Parliament in each individual case.

LORD PEEL, speaking for the Government, did not suppose the effect of the Bill would be very large, but its operation would probably be very useful in those areas which were not supplied with electricity, and were not of such a character as to encourage the ordinary electricity undertaking to enter for the purpose of giving a supply. He thought they might have full confidence in the Electricity Commissioners.

The Bill was read a second time.

The Government and Unemployment.—In the course of his reply to the vote of censure, in connection with the increase of unemployment, moved by Mr. Ramsay MacDonald, on June 29th, the PRIME MINISTER stated that the Government had a practical scheme of electrical development under examination. If the Committee which was considering it reported that the scheme was workable the Government would immediately take the necessary steps to enable it to be carried out. The Premier also mentioned the importance to industry of scientific research, which, he said, would always be aided by the Government. Referring to low-temperature carbonisation, he said that if the results of the East Greenwich experiment justified it, the Government would consider the erection of a plant on a commercial scale.

Correspondence.

***Correspondents should forward their communications* at the earliest possible moment.** *No letter can be published unless we have the writer's name and address in our possession.*

Installation Policy.

Mr. L. L. Robinson, at the I.M.E.A. Convention at Brighton, faced with characteristic courage the very real and vital problem of the extension of electricity supply into the homes and premises of the great mass of the people.

This important paper, not to speak of its subject matter, is not discussed in the present communication. A few points only are considered which call for immediate comment.

He remarks that the primary object of a wiring contractor is to make a profit. Had this been so, the financial strength of the contracting industry would not have left it so helpless in the face of piratical attack from municipalities or others who imagine that they could rule more to their advantage the provinces they covet.

Mr. Robinson says that "electrical contractors have come into existence through no fault of their own, but because in the early days suppliers of electricity entirely neglected 'the service to the consumer' end of the business." Before 1880-81, contractors were engaged upon arc lamp installations, A B C telegraph lines, electric bells and signals, and latterly telephone work. Then their early enterprise founded the electric light industry. They had to devise and make their own accessories and experiment with wiring methods and I see very little to use to-day that was not tried in those early days. Where no existing mechanical power drive was available, they installed gas engines, steam sets, or water power to drive their dynamos. During the next ten years they dotted not only the towns but the whole country with private installations before ever there were any municipal engineers to speak of. The "Chiefs" of public supply stations may now be eternal with a hankering after omnipotence backed by taxation—but they had a beginning.

Nor did the earliest supply stations themselves come into being without the eager enterprise of contractors. In Scotland, probably also elsewhere, some of the pioneer stations were largely, if not entirely, conceived and founded by wiring contractors. These contractors had the ear of the public and gave at least enthusiastic and effective support to all good public schemes. They still do so in a measure. By far the greater part of the existing load was built up by the personal efforts of the wiring contracting trade. To-day every extension of area acquired by a supply authority delivers a harvest of independent plant installations sown by the contractors and reaped by the supply people without compunction or any compensation to those who have pioneered and prepared the field.

We do not hear of any movement in the Contractors' Associations to reduce the supply chief to the position which Mr. Robinson desires for the contractor, which is that of a compulsory servant of his destroyer, underpaid, overtaxed, robbed of all freedom, independence and initiative, forced to contribute to rival showrooms, but for his own, charged full rates for electricity used for advertising electricity supply.

Yet two problems remain—the "curbstoners" and the cheap wiring system. These demand further consideration.

Meanwhile each electrical contractor of vision will hasten to apply for formal registration. This subject also has its difficulties, but if all pull together, they can be solved.

Donald S. Munro, M.I.E.E.,
Registered Electrical Installation Contractor.

Edinburgh, *June 22nd*, 1925.

The Electrocution of Rats.

Forgive me for pulling your leg, but if any reader can advise us whether a scheme for the extermination of rates by electrocution has ever been devised, will he add if it can be applied to rate collectors?

Francis Thos. Fawcett.

Woodford Green, *June 22nd*, 1925.

[We fear the millennium is not yet due—only the rates.—EDS. ELEC. REV.]

A British Institute for Radio Engineers.

It would be of great interest to have more light on Mr. Nelson's proposal to form a new engineering society. In his letter he deals fairly fully with the constitution of the new society, but beyond stating that a really technical society for

wireless engineers is wanted in Britain, he does not put forward any real arguments in favour of such a step. Personally I can see several arguments *against* the proposal, and to put forward a materialistic point of view first I would mention that most engineers already pay quite enough annually in the form of subscriptions. From this point of view alone we want to limit the number of societies as far as possible. But the real point is: is there a real need for such a society as is proposed by Mr. Nelson, from the *technical* point of view? Apparently Mr. Nelson's objection to the Wireless Section of the I.E.E. is that one must be an electrical engineer before one can join the Wireless or any other section of the I.E.E. But surely this is as it should be, for a fully qualified wireless engineer must of necessity be an electrical engineer. I take it that the proposed new society is intended for those professionally engaged in the engineering aspect of wireless, and it therefore seems to me that the Wireless Section of the I.E.E. exactly covers all the ground and there is no sound argument for this ground being shared by a new society.

Incidentally, I notice that Mr. Nelson has discussed the matter with several "advanced *amateurs*." Why should amateurs however far advanced, be interested in the formation of a *professional* society? There is already a technical society for amateurs, the Radio Society of Great Britain, and I think it is very desirable that the amateur and the professional interests of wireless engineers should be looked after by separate bodies. These two separate bodies already exist, so why worry?

J. F. Stanley, B.Sc., A.C.G.I.

London, *June 27th*, 1925.

[Mr. Nelson asks that all letters on this subject should be addressed to 66, Oxford Road, Manchester.—EDS., ELEC. REV.]

The Value of Super-Power Schemes.

The fourteenth annual report on the Toronto hydro-electric system, for the year ended December 31st, 1924, has just come to hand, and I quote the following figures therefrom:—

Kilowatt-hours sold: 485,708,476.

Net cost of energy purchased in bulk: 25 dollars per h.p.

The comparative figures for 1921 are as follows:—

Kilowatt-hours sold: 221,384,558.

Net cost of energy purchased in bulk: 18.54 dollars per h.p.

Despite an increase, therefore, of 120 per cent. in sales, there is an *increase* in the cost of bulk supply of 35 per cent. This, however, does not complete the story, and I quote the following paragraph in full from the report:—

"*Rates.*—At the date of issuing this report, it does not appear likely that the present rates will be entirely sufficient to meet operating and fixed charges and the cost of power during the year 1925, and it is possible your Commissioners will be under the necessity at the end of the year of making an appropriation from the system's reserve for the stabilisation of rates, which is fortunately ample. Your Commissioners believe it is better to meet the situation in this way, rather than to apply to the Hydro-Electric Power Commission of Ontario for authority to put into effect an increase in rates which would be severely felt by the customers of the system under existing industrial conditions. It is hoped that improvement in general business will before long enable your Commissioners to meet all charges with the existing scale of rates."

This demonstrates once again that there is an economical limit of expansion to any business or undertaking, and the following extract from the report of the Royal Commission on London Government further confirms this:—

"In 1911 a notable article in the *Journal* of the Royal Statistical Society on "Population and Costs in relation to City Management," was referred by the County Council to their comptroller and assistant statistical officer for their report. After some criticisms of the article, these officers reported as follows: 'The general conclusions of the writer of the article in question, however, appear to be borne out by the tables accompanying this return. It will be seen that the cost of administration per head of population shows an upward tendency as the size of the town increases, and dividing the towns given into two groups, it will be seen that the cost per head in towns of a population of 250,000, or over, considerably exceeds that in towns with a population under 250,000. . . ."

Will our super schemes prove an exception?

F. W. Purse,

Engineer and Manager, West Ham Electricity Dept.

Stratford, *June 24th*, 1925.

Technical Journals for Boys.

I have read with interest the letter on "Technical Journals for Boys," and the remarks by "Junior" on young engineers' clubs. I am teaching under the L.C.C., and am anxious to assist in developing young engineers or technical workers interested in anything connected with their work, apart from their daily "going to work," and to induce them to take advantage of the facilities for technical training offered in evening classes which a large number of day workers treat as a task instead of a valuable addition to their "daily grind."

I am willing to offer my services to "Junior" for one evening a week, either to assist in his scheme for a club or to lecture for one hour on an engineering subject without remuneration, and may perhaps induce some students to join. Or I would write a short practical article for the technical journal (free) for young engineers on engineering subjects periodically.

Arthur J. Rayner, A.M.I.Mech.E.,

Late Indian Educational Service, Bengal.

London, *June 19th*, 1925.

Charging for Light.

As so many lighting consumers do not understand the value of a "unit" or one kilowatt-hour, would it not do to say it is equal to two thousand candle-power-hours, and that is what they will obtain provided efficient "half-watt" lamps are used?

Gas is generally charged at so much per 1,000 cubic feet, but that conveys no idea to the ordinary consumer as to what lighting power it will give. It is the same with the electricity bill, so much per 1,000 watt-hours or per unit.

Make the unit equivalent to 2,000 candle-power-hours, and consumers will be more satisfied.

W. H. R.

June 25th, 1925.

[An objection to this system is that the candle-power-hours vary with the size of lamp. Only the largest gasfilled lamps approach the value stated; and over-statement is highly undesirable.—EDS., ELEC. REV.]

Lead-Covered Wiring and Visible Bonding.

As constant users of lead-covered cable we have watched, with some interest, the various shades of opinion expressed in your columns, on this form of wiring.

In reply to some of the critics who favour non-metal-covered systems, from experience we are for a metal-covered, properly bonded and earthed system every time. There is no doubt that metal is far superior to rubber, or similar material protective covering, if the bonding is done properly. The whole installation can be easily nullified by inefficient bonding, but with good-class fittings of reputable make, satisfactory bonding in the right hands becomes an easy and speedy matter.

Butler & Dickinson.

R. H. DICKINSON.

Birmingham, *June 24th*, 1925.

We have noticed in several recent issues that some of your readers seem to fight shy of this type of wiring on account of alleged troubles in bonding. We have used a well-known wiring system for many years in large quantities on the best class of work in Scotland, and could not wish for anything more simple, either in jointing or bonding.

W. C. Martin & Co.

Glasgow.

[This correspondence is now closed.—EDS. ELEC. REV.]

The Storage of Coal.

With a shadow of promised unrest either in the coal fields or the railways, engineers of power stations become wary these days and make provision by getting in ample stocks of coal.

This has to be stacked in varying heights from some 5 ft. high and where one has less room it has to be stacked perhaps 16 ft. high.

I wonder if any other engineer has discovered, as I did some years ago, that by taking a reading with a battery testing voltmeter across the vent pipes, which some engineers let down in the coal at intervals of about 12 ft., one can get a reading from 0.05 volt up to, say, 0.3 of a volt; and when its reading is high, it is time to look for combustion taking place in your coal heap.

H. W. Watts.

Cheltenham Electricity Works, *June 27th*, 1925.

Legal.

The N.S. Battery & Equipment Co., Ltd.

MR. JUSTICE RUSSELL, in the Chancery Court on June 26th, heard a motion, presented by Mr. Hecksher, for the appointment of a receiver of this company in a debenture holder's action on the ground of jeopardy.

Mr. HECKSHER said the ground of jeopardy was that the company had stopped business owing to entire lack of funds. The company was one that manufactured non-sulphating batteries. A number of ebonite containers was bought by the company at the end of last year which turned out to be faulty, and as it gave a guarantee with the battery the company was being pursued by customers to fulfil these guarantees. The water and electric light at the premises had been cut off, and the company had come to a stop. Summonses were pending and there were threats by creditors. The application was not for the appointment of a manager because there was apparently no business at the moment to manage.

Mr. MANSELL, for the company, consented to judgment.

His LORDSHIP made an order for a receiver of the company.

Comerton v. Multi-Way Earthing Clip Co., Ltd.

IN the Southwark County Court, on June 29th, Mr. E. Comerton, a commercial traveller and electrical engineer, sued the defendant company, of Old Kent Road, S.E., for the sum of £47, stated to be commission due on the sale of "Exide" batteries. Mr. WHITE, for the plaintiff, said that his client was engaged by the defendants to sell their earthing clips, on a salary of £3 per week and 5 per cent. commission on sales. In addition the plaintiff had sold a number of "Exide" batteries on which commission was also claimed. Subsequently his salary was increased to £4 per week, but the commission was stopped.

For the defence it was stated that the £1 increase was given as a temporary measure until the rate of commission on the sale of the batteries was fixed.

Judge Sir THOMAS GRAINGER held that there was an agreement for the plaintiff to receive commission. He would not, however, allow the cost of a season ticket to plaintiff. Judgment was given for plaintiff for £28 5s. and costs.

Electrical Trade of Kenya and Uganda.

THE following table, based on the recently-issued official trade returns, shows the value of the imports of electrical and allied material into Kenya and the Uganda Protectorate during the past year. The figures for 1923 have been given for purposes of comparison and notes of any increases or decreases added.

	1923. £	1924. £	Inc. or dec. £
Electric wire and cable, insulated.—			
Total	72,000	2,600	−69,400
From United Kingdom ...	71,500	2,500	−69,000
,, Germany	200	—	− 200
Electric wire and cable, not insulated.—			
From United Kingdom ...	400	6,000	+ 5,600
Electrical goods and apparatus not elsewhere specified.—			
Total	6,000	29,000	+23,000
From United Kingdom ...	4,000	28,000	+24,000
,, Germany	500	400	− 100
,, Sweden	700	—	− 700
,, United States	500	500	—
Telegraph and telephone instruments.—			
From United Kingdom ...	500	7,000	+ 6 500
Cranes, hoists, and lifting machinery.—			
Total (United Kingdom) ...	400	17,400	+17,000
Electrical machinery and parts.—			
Total	2,200	19,000	+16,800
From United Kingdom ...	1,900	17,500	+15,600
,, France	—	400	+ 400
,, United States	300	1,000	+ 700
Steam engines.—			
From United Kingdom ...	9,000	26,000	+17,000
,, United States	—	1,000	+ 1,000
Industrial machinery and parts.—			
Total	132,000	193,000	+61,000
From United Kingdom ...	125,000	175,000	+50,000
,, India	2,000	4,000	+ 2,000
,, Germany	2,500	6,000	+ 3,500
,, United States	1,700	4,000	+ 2,300
Pumps and pumping machinery.—			
Total	3,200	10,000	+ 6,800
From United Kingdom ...	2,800	9,000	+ 6,200
,, United States	400	700	+ 300
Machinery, not specified, other than agricultural.—			
Total	7,000	19,000	+12,000
From United Kingdom ...	6,000	17,000	+11,000
,, Germany	500	700	+ 200
,, United States	500	500	—

Reported New Elements.—An announcement made by Prof. Walter Nernst at the last meeting of the Prussian Academy of Science dealt with the reported discovery of two new elements by the physicist, Dr. Walter Nonnack, and Fräulein Eva Tacke, assisted by Dr. Otto Berg. The elements, which are said to have been detected by chemical analysis, and also by the Röntgen spectroscopic process, may be obtained from a number of mineral substances, of which the principal is platinum ore. Their atomic numbers are 43 and 75, and they have been named masurium and rhenium, after the East Prussian borderland and the Rhine.—*The Times.*

Published Specifications.

Compiled expressly for this journal by Patent Agents.
The name of the applicant's patent agent, if any, will be found on the printed specification.
The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1923.

30,061. "Telegraphic apparatus for the automatic reception and retransmission of electric signals." Creed & Co., Ltd., and F. G. Creed. November 29th, 1923. (234,856.)

32,582. "Electric switches." Creed & Co., Ltd., E. A. Willson, R. D. Salmon, and S. E. Kirk. December 31st, 1923. (234,860.)

1924.

165. "Electric or other drives for lathes or other machines." V. A. Pinckney. January 3rd, 1924. (234,861.)

3,155. "Electric transmission for vehicles." Tilling-Stevens Motors, Ltd., H. K. Whitehorn, and N. E. Kearley. February 0th, 1924. (234,868.)

5,158. "Apparatus for television." G. J. Blake and H. J. Spooner. February 28th, 1924. (234,882.)

5,287. "Coil plugs and coil holders for use in radio instruments." G. F. Pickett and A. North. February 29th, 1924. (234,887.)

5,438. "Automatic electric direction-indicator for motor vehicles." T. W. Bennett. March 3rd, 1924. (234,892.)

5,460. "Electric telegraph retransmitter." F. E. Pernot. March 3rd, 1924. (234,894.)

5,474. "Microphones." H. J. Round. March 3rd, 1924. (234,895.)

5,542. "Device for enclosing a record of telephone addresses or other information and readily displaying said record when required." R. G. Thomas and B. Elliott. March 4th, 1924. (234,898).

5,820. "Method of constructing thermionic valves." P. V. Castell-Evans and J. M. Longe. March 6th, 1924. (234,906.)

6,109. "Thermionic valves." W. R. Bullimore. March 10th, 1924. (Cognate application, 21,263/24.) (234,916.)

6,332. "Storage batteries." F. J. Brown. March 12th, 1924. (234,921.)

6,355. "Control of the conditions of operation of electric motor-generator sets." English Electric Co., Ltd., and J. Birrer. March 12th, 1924. (234,924.)

6,459. "Electric junction boxes and the like." G. H. Scholes, F. J. Pearce, and G. H. Scholes & Co., Ltd. March 13th, 1924. (Cognate application, 14,796/24.) (234,925.)

6,739. "Electrical synchronising apparatus." A. B. Field, T. W. Rose, and Metropolitan-Vickers Electrical Co., Ltd. March 15th, 1924. (234,936.)

6,944. "Control of electric motors." E. A. Binney and Metropolitan-Vickers Electrical Co., Ltd. March 18th, 1924. (234,938.)

6,993. "Sound-reproducing apparatus." J. G. A. Kitchen. March 19th, 1924. (Patent of addition not granted.) (234,939.)

7,810. "Indicators for electric signalling systems and the like." R. Bullough. March 27th, 1924. (234,942.)

9,433. "Battery separator plate." W. B. Stone. April 14th, 1924. (234,954.)

10,662. "Apparatus for reception of wireless signals and the like." G. W. Hale and Radio Engineering Co., Ltd. April 30th, 1924. (234,965.)

10,667. "Anodes of vacuum electric-tube devices." E. Y. Robinson, E. J. E. Hubbard, and Metropolitan-Vickers Electrical Co., Ltd. April 30th, 1924. (234,966.)

11,727. "Electric lampholders and the like." J. Stone & Co., Ltd., and A. H. Midgley. May 12th, 1924. (234,974.)

11,772. "Electric wash boilers." B. Kay. May 13th, 1924. (234,975.)

11,802. "Electrical switches and switch fuses." Midland Electric Manufacturing Co., Ltd., and W. L. Barber. May 13th, 1924. (234,976.)

12,148. "Loud-speaking telephone receivers." J. W. Hobley. May 17th, 1924. (234,980.)

12,305. "Electric condensers." T. Hough. May 20th, 1924. (234,981.)

14,036. "Regulation of electric circuits." Igranic Electric Co., Ltd. (Cutler-Hammer Manufacturing Co.). June 10th, 1924. (234,999.)

14,226. "Sparking plugs." L. S. Clarke. June 12th, 1924. (235,001.)

14,384. "Magneto-electric machines." M. L. Magneto Syndicate, Ltd., and E. A. Watson. June 13th, 1924. (235,004.)

16,949. "Telephone systems." Coventry Automatic Telephones, Ltd., and J. E. Collyer. July 15th, 1924. (235,027.)

19,380. "Rotor for electrical machines." W. Regelein, R. Sameith, and Thyssen & Co. Akt.-Ges. August 15th, 1924. (235,046.)

20,219. "Rheostats or variable resistances." Acme Production Co., Ltd., and W. D. Vick. August 27th, 1924. (235,051.)

20,265. "Inductance coils." Western Electric Co., Ltd. (Western Electric Co., Inc.). August 27th, 1924. (235,053.)

22,553. "Telephone systems." Coventry Automatic Telephones, Ltd., and J. E. Collyer. September 24th, 1924. (235,064.)

23,751. "Device for measuring the apparent consumption in single and polyphase alternating-current circuits." Landis & Gyr Soc. Anon. November 9th, 1923. (224,512.)

24,255. "Incandescent cathode discharge tubes." Naamloose Vennootschap Philips' Gloeilampenfabrieken. October 17th, 1923. (223,564.)

24,279. "Electrical switch-boxes." H. E. Kammerer. October 13th, 1924. (235,070.)

24,357. "Flat electric cables for weak-current purposes and process of manufacture thereof." Siemens & Halske Akt.-Ges., K. Bohme, and H. Schmidt. October 14th, 1924. (235,072.)

24,800. "Switch arrangement for electric flat-irons." E. Berchtold. October 18th, 1924. (235,073.)

26,911. "Incandescent lamps and similar devices." British Thomson-Houston Co., Ltd. November 12th, 1923. (224,894.)

28,763. "Contact breakers for magnetos and like ignition apparatus." Fabrica Italiana Magneti Marelli. February 7th, 1924. (228,866.)

1925.

2,229. "Advertising and like signs." A. H. Brackensey and Franco-British Electrical Co., Ltd. January 24th, 1925. (235,105.)

5,556. "Wireless receiving apparatus." Naamloose Vennootschap Philips' Gloeilampenfabrieken. February 29th, 1924. (230,097.)

11,301. "Electro-deposition of metals." T. W. S. Hutchins. March 4th, 1924. (Addition to 197,066, divided application on 5,604/24.) (235,123.)

New Italian Magneto.—According to *Il Sole*, a meeting was held recently at the Royal Polytechnical Institute, Milan, at which the working of a new type of magneto invented by Signor Rinaldo Bassi was demonstrated. The magneto is said to be of simple and inexpensive construction and to work perfectly. A company is to be formed shortly to manufacture the new machine.—*Reuter's Trade Service* (Milan).

The

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Electrical Developments in Russia.

THOUGH the situation in Russia continues of such a character as to excite little practical interest on the part of British traders and manufacturers who desire to co-operate in the work of electrification, it is desirable that they should keep themselves informed regarding the course of events, through our periodical publication of Russian Notes.

It is reasonable to believe that a fair volume of work is in progress and that activity is not limited to the conferences, Commissions, and other official features of the Soviet organisation. From the reports that have reached us from time to time during the last few years there is plenty of evidence of the ambitions of certain minds for electrical developments to be proceeded with on a vast scale; great plans are mooted for electricity works, for production of machinery and equipment, for co-operation between electricity supply and industrial works; large sums are suggested for expenditure on new works during specified periods, and while one may find it difficult to arrive at any clear knowledge regarding the work that is actually being done and the prospect of its efficiency or success, there is no doubt that behind the screen, or the haze, electrical progress is being made.

One of the latest reports to reach us is to the effect that the Electrification Section of the State Planning Commission has arrived at decisions on a number of points affecting the further development of the production of electrical manufactures and the reduction of their cost. The difference between the prices of foreign manufactures and those of goods made in Russia is found to be largely due to the backwardness of Russia technically, and it is considered that the "rationalisation" of the native industry is necessary in order to reduce prime costs. Under the prevailing conditions of reconstruction and of extension of output, however, such a "rationalisation" scheme in complete form cannot be realised. Therefore, it is deemed essential in the first place to limit attention to the adoption of production in bulk of single types of manufactures. It is also considered necessary for the selling prices of foreign manufactures and those of the native works to be unified in order that those of Russian products should not exceed foreign prices by more than 10 to 15 per cent., including expenses, import duties, and freights, and the State Planning Commission has asked the Committee of Internal Trade, in conjunction with the Supreme Council of National Economy and the Foreign Trade Commissariat, to draw up a scheme to this end. It is thought that the amount of the import duties, with the addition of the 10 to 15 per cent. in question, should be allotted to a special fund for disposal on a

systematic basis. Thus, the fund would be devoted to covering the losses of the Soviet works owing to the reduction in prices, to the "rationalisation" of the production of manufactures the output of which in the first place must be improved, and to the granting of credit to the Russian works so as to permit them to deliver mass production for stock. Moreover, and in order to lower the costs of production, the Electrification Section considers it necessary for the industry to be exempted from the payment of import duties on raw and semi-finished materials required for manufacturing.

The upshot of the deliberations of the Section is the appointment of a committee consisting of representatives of the State Planning Commission, the General Electrical Commission, the two electrical machine trusts, and the Electrical Bank, to prepare concrete proposals along the foregoing lines.

The immediate necessities cannot wait, however, and while the Sectional Committee was settling down to its deliberations affecting the future, the Industrial Planning Committee was approving plans for the programme of production for the six months ending next September. This programme provides for the increase of the output of electrical manufactures to 35,775,000 pre-war roubles, as compared with 27,246,000 roubles in the first half of the current fiscal year. As to the financial position of the manufacturing industry, the Commission foresees a cash deficiency of about 20,000,000 roubles in the second half of the year, which deficit it is proposed to meet by obtaining credit from the bank, instalments on sales, and by the grant of a subsidy of 6,500,000 roubles by the State, for which application has been already made.

Further reports just to hand state that a conference to discuss matters concerning the electrification of Russia was held in Moscow in the third week in June under the presidency of L. D. Trotsky. Various reports were presented and considered. In the first place it was stated that a total of 126,000,000 roubles had already been expended on works in connection with the great scheme of electrification which was approved five years ago and was estimated to involve an outlay of 2,400,000,000 roubles. This work is being continued, and large sums must be provided in the Budget estimates for the next two years. During the discussion it was pointed out that the rate of general industrial regeneration last year had a great effect upon the matter of electrical construction. Last autumn a serious danger arose that the great regional stations would be unable to find consumers, but the situation had now radically changed. The existing stations were not only fully loaded, but those which were not yet completed were assured of a full utilisation, while the question of extending the Schatur station had been raised in connection with the development of the supply system in the region of Moscow. As to the question of where and how further stations should be built, Mr. A. Goreff suggested that it was necessary to proceed in the direction of establishing combinations of generating works with industrial works as had been effected in the case of the Nischni Novgorod generating station, which had been combined with nitrogen works and paper mills. Regarding the supply of the necessary materials for electrification, representatives of the manufacturing trusts raised objections to the placing of orders in other countries. While being an advocate of the protection of national industry, Mr. Trotsky stated that protectionism must not lead towards a self-blockade. The international distribution of work must be taken into consideration. Having regard to the fact that the Russian electrical industry was behind other industries in the republic, a portion of the orders must be given abroad. The question of the concentration of the import trade in the hands of the Electrical Bank or directly in those of the trusts, was also discussed. By means of such concentration it was reckoned that it would be possible to reduce the sale prices of manufactures for groups of customers as, for instance, for rural electrification works. In this connection representatives of large customers as, for example, the Moscow (Moges) supply combination, drew attention to the inefficient execution of orders by the electrical trusts and the difficult conditions of payment, expressing themselves in favour of an extended scope of imports, confining the trusts to the bulk production of manufactures in extensive demand. On their part the trusts urged the necessity for the installation of improved equipment and organisation at their works, which could be attained through the acquisition of technical assistance from foreign works.

From the foregoing it will be observed that while a large section is in favour of the production of equipment in Russia, it is realised that at present such an ideal is unattainable. Much of the material necessary to the execution of the vast schemes which are in contemplation must be obtained from external sources.

The Wireless Telegraphy Explanation Bill.

As we have already announced, the new Wireless Telegraphy Bill introduced in the House of Commons early in this session is not to be proceeded with in its present form. But a short Bill, somewhat quaintly entitled "The Wireless Telegraphy (Explanation) Bill, 1925," has been introduced instead. Its object is stated to be to remove doubts as to the meaning of the expressions "transmission" and "rent or royalty" contained in the Wireless Telegraphy Act, 1904. "Transmission," where used in Sub-section (7) of Section 1, and in Section 2 of the Act in relation to messages, is to include and is to be deemed always to have included the reception as well as the sending of messages. And the expression "rent or royalty," where used in Section 2 of the Act of 1904 in relation to licences, is not to include, and shall be deemed never to have included fees (whether periodical or of any other kind) charged in respect of the grant or renewal of licences.

As regards the first of these "explanations," it is to be regretted that the Bill has not extended it to "messages." Is an orchestral or other piece, for instance, a message within the meaning of the Wireless Telegraphy Act and the Telegraph Acts, as a part of the monopoly of the Postmaster-General? The proviso in the 1904 Act which has been relied on by possessors of unlicensed crystal receiving sets, excludes from the definition of wireless telegraphy contained in the Act of 1904 electrical apparatus made or used "for any purpose other than the transmission (and also, according to the Bill, 'reception') of messages." What is really meant by "messages"? Section 2 of the 1904 Act, in which "reception" is also to be read as included in "transmission," refers to telegrams, including wireless telegrams, "*as within the exclusive privilege of the Postmaster-General*," and therefore clearly means messages in the strict sense of the word, and not musical or dramatic performances. Thus this interpretative amendment serves to increase the doubt raised on the construction of Sub-section (7) of Section 1. It would seem, therefore, that even if the Bill, as introduced, is passed, unlicensed broadcast listeners may still be tempted to defy the Postmaster-General. Reliance by the latter on the fact that the items in the broadcast programmes are generally preceded by an announcement, which may be regarded as a "message" to the listeners, does not seem to be of sufficient substance to settle what, after all, is a doubt of tangible importance.

The agreement between the Postmaster-General and the British Broadcasting Co., Ltd., of January 18th, 1923, to which attention was drawn in these columns on May 18th, 1923, in a special article by Mr. W. H. Stoker, K.C., seeks partially to get over the difficulty by defining "telephone" and "broadcast matter"; but, as pointed out in that article, this is merely part of the terms of a licence as between the Postmaster-General and the Broadcasting Co., and does not bind the public. Nor has it, of course, the same authority as a definition in an Act of Parliament. Altogether, it is very doubtful whether this new amending Bill will achieve what is no doubt intended by it, and get over the difficulty that the Postmaster-General's privilege or monopoly is concerned with "messages" and not with "concerts."

With regard to the "explanation" of the meaning of the expression "rent or royalty," as used in the Act of 1904, which it is now stated was never intended to have included fees in respect of the grant or renewal of experimenters' licences, it has been explained unofficially in the columns of *The Times* of June 30th, 1925, that the intention of the 1904 Act was to relieve experimenters from any payment in respect of the monopoly rights of the Postmaster-General, and that this was the meaning of the use of the words "rent or royalty," and that the fees charged for experimenters' licences were to cover charges attending administration and the investigation of applications for experimental licences. It is, to say the least, doubtful whether it was really contemplated or intended by Lord Stanley, when he stated in the House of Commons in 1904 that he desired to make it *as easy as possible* for people to conduct experiments, and therefore moved to add the words: "But shall not be subject to any rent or royalty," that the Postmaster-General's Department should introduce a tax on experimenters in the guise of fees, periodical or otherwise; and the public will look on the so-called "explanation" as amendment pure and simple, due to bureaucratic administration of what was intended as an encouragement of, and not a tax on, scientific investigation—an amendment, too, which leaves the Department free to charge exorbitant fees. Altogether this new "explanatory" Bill cuts rather a sorry figure.

The Railway Centenary Celebrations.

THE celebration at Darlington and Stockton last week of the centenary of railways was as full of historic significance as of personal sentiment, and the wonderful procession of rolling stock over that little stretch of line—only a dozen miles in length—which connects the two towns named was a singular display of the progress made in locomotive engineering in a hundred years.

The chief events were reserved for Thursday (July 2nd), when the historic procession was witnessed by a quarter of a million persons; for one hour there passed in quick succession a representative collection of engines, coaches, wagons, &c., such as had never been witnessed before. It was marvellously well staged, and a triumph of organisation.

In all the display there were few features that made special appeal to the electrical engineer. In the procession there was an electric locomotive built at the Darlington works of the North-Eastern Railway in 1914 to the design of Sir Vincent L. Raven for hauling freight trains over the Shildon-Newport electrified section; this engine is fitted with four motors transmitting power through spur-gearing to wheels which have a diameter of 4 ft. Later there came along an electric passenger engine, also designed by Sir Vincent Raven, and built at the same works; it was originally intended for use on the main line of the N.E.R. between Newcastle-on-Tyne and York, the electrification of which, however, has not yet been carried out. This engine is equipped with three motors with twin armatures transmitting power through spur-gearing and quill drive to wheels which have a diameter of 6 ft. 8 in. Mention may also be made of the electric cooking installation on the latest "Flying Scotsman." The suspended scheme for the electrification between Newcastle-on-Tyne and York was an ambitious one, which may develop sectionally. On the north side of the Tyne, between Newcastle and the coast, there is a very efficient electric service forming a circular route, which serves a large population, and this system, it is contended, might well be extended to the south side of the river. Apart from traction, however, immense use is made of electricity in lighting, signalling, &c., on railways.

The Johnson and Phillips Jubilee.

So few electrical firms that were in existence 50 years ago have survived the struggle for existence, which in the early years of this century became very strenuous, that such an occasion as the attainment by Messrs. Johnson & Phillips of their jubilee is indeed a notable event, with few precedents. We commented on its approach at some length in our issue of May 15th, and showed that the prosperity of the company was on a steep up-grade, whilst the chairman of directors (one of the original founders of the firm), Mr. W. Claude Johnson, looked forward to "still more astonishing progress in store for the electrical industry." We hope, and believe, that his confidence is well founded.

In the course of the luncheon, which is reported elsewhere in this issue, some stress was laid by the chairman, Mr. J. Macgregor, on the fact that the company, though older than most electrical firms, was young in spirit; he liked "old faces," but believed in affording young blood the opportunity to make good. Certainly in the shops there was plenty of evidence that the company's products were in every way up to date, and their popularity was demonstrated by the quantity of work that was passing through the various departments, as well as by the very satisfactory report that we recently recorded, which showed that a large and increasing proportion of the output was for export trade. Clearly, with the experience of mature age and the enthusiasm and enterprise of youth combined, "J. & P." is going to maintain its position in the front rank of electrical engineering in the future as in the past, and it has our heartiest congratulations and best wishes.

Electrical Accidents.

THE annual report of H.M. Senior Inspector of Factories and Workshops, an abstract of which is commenced elsewhere in this issue, is an instructive publication of considerable value. Considering the development of the electricity supply industry that took place during the period under review, it was to be expected that the number of accidents would increase, the figure being 20 per cent. The basis on which the accidents are reportable is not, however, quite the same as that of the previous year, for it is pointed out that there is now required a disablement of more than three days, as against more than one day only in 1923. This change tends to reduce the number of reportable accidents, but owing to the incidence of the Workmen's Compensation Act in 1924, the reporting of accidents is receiving more attention than in past years. No useful deduction can be drawn from the slightly greater proportion of fatal accidents, and the remarkable fact is that so many persons meet with severe accidents from shock every year at high and extra-high pressure and yet survive, although in some cases with permanent injuries.

Although most engineers regard the divisional inspectors' suggestions and recommendations seriously and co-operate heartily, instances are recorded of the management being unsympathetic, an attitude which is past understanding, for unsatisfactory plant and conditions not infrequently necessitate the enforcement of drastic alterations which are costly and occupy a considerable amount of valuable time. Too many engineers seem to install plant for the time being without giving thought to the future; as the system grows, they find themselves in difficulties through their failure to commence the sectionalisation of switchgear in the early stages, and expensive alterations become necessary which far exceed in cost the original saving. Another point that evidently needs emphasis is the number of public supply systems which are being changed from d.c. to a.c. When the consequent alterations are made to the consumers' installations, attention should not be confined to the power circuits; neglecting to overhaul the wiring and lighting fittings is a dangerous oversight, for after many years' use with d.c. in factory premises they may be quite unsuitable for conversion to alternating current.

It is gratifying to learn that the standard of industrial illumination is being raised, and that the quality of work in factory installations generally shows a distinct improvement. Nevertheless, contractors and works electricians come in for criticism, the northern area divisional inspector remarking that many firms would save considerably and secure more reliable work by employing a qualified consulting engineer.

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Electricity in the Chilian Nitrate Works.

The Application of Modern Methods to a Highly Conservative Industry.

By "RETAC."

THE Chilian nitrate industry is one which is not very widely known amongst engineers, but the facts that it consumes annually very large quantities of engineering material, employs, indirectly or directly, somewhere about 200,000 people, and presents some very interesting problems indeed, should render a few notes as to the manufacture of Chilian nitrate of particular interest.

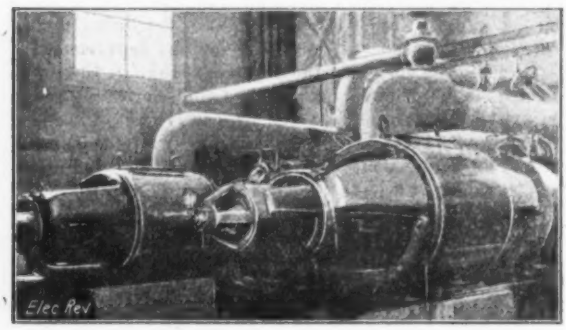


Fig. 1.—Two 300-kW Turbo-Alternators.

Chilian nitrate of soda is obtained from a crude saline material, called "Caliche," which is found in the northern deserts of Chile, between the 18 deg. S. and 26 deg. S. latitudes. The supplies of "caliche" in sight have been materially reduced by the methods of the early operators in the field, which have resulted in the "eyes" of the properties being literally picked out, numbers of them having to close down for lack of material of a sufficiently high percentage to justify their working. However, the advent of electricity has materially assisted in bringing about such large reductions in working costs that operations are being resumed, and material of a much lower percentage is now being treated at a profit. To-day, the power plant and electrical equipment of a modern nitrate oficina, *i.e.*, nitrate factory, are as up-to-date as those of any industrial concern in England, and the visitor to the Pampa may see any number of well-equipped central stations containing a.c. machinery and switchgear, and employing h.p. transmission to pumping stations, which may be anywhere up to 15 miles from the oficina.

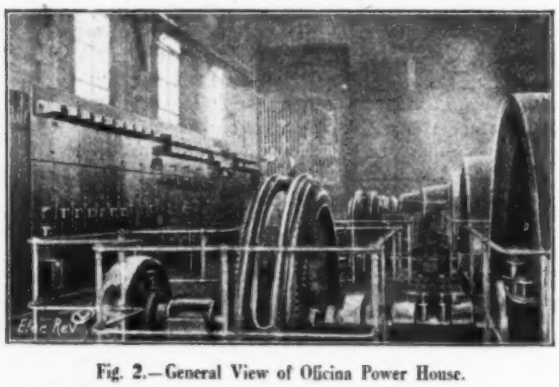


Fig. 2.—General View of Oficina Power House.

Briefly, the "Shanks" process for the extraction of nitrate of soda from "caliche," which is the system used in the majority of oficinas, consists in the deposition of nitrate crystals from a solution of the raw material. The "caliche" is placed in water in tanks and boiled up with the water to form a "caldo," or nitrate-bearing solution. This "caldo," on leaving the boiling tanks, goes, after clarifying, to open tanks or "bateas," where it is allowed to cool off, and in the process deposits nitrate crystals. The "caldo," or, as it is now called, "agua vieja," after cooling to the proper temperature, is run off from the "batea" to return *via* a settling tank to the boiling tanks to repeat the cycle, and the deposit of nitrate crystals left is dug out of the "batea" by hand, and later deposited on the drying floors to await sacking and dispatch to port. There are, of course, numerous elaborations of this treatment, and some special processes which need not be described here, as our purpose is merely to give an idea of the part played by electricity in the production of commercial nitrate of soda.

Electricity is in use right from the commencement of the operation of extracting the material from the ground to the disposal of the refuse or "ripio." Motor-driven air compressors furnish the air necessary for modern rock drilling equipment, the use of which is rapidly spreading, and is materially reducing the cost per ton of raw material extracted. We next find it in use for locomotives, which haul ore trains over considerable distances to the treatment plant, where electrically-driven crushers and conveying equipment place the material in distributing bins over or adjacent to the boiling tanks. A process such as the "Shanks" must necessarily employ a large number of pumps to deal with the liquids, and these, which may be of the centrifugal or ram type, are invariably driven by electric motor, more often than not direct coupled.

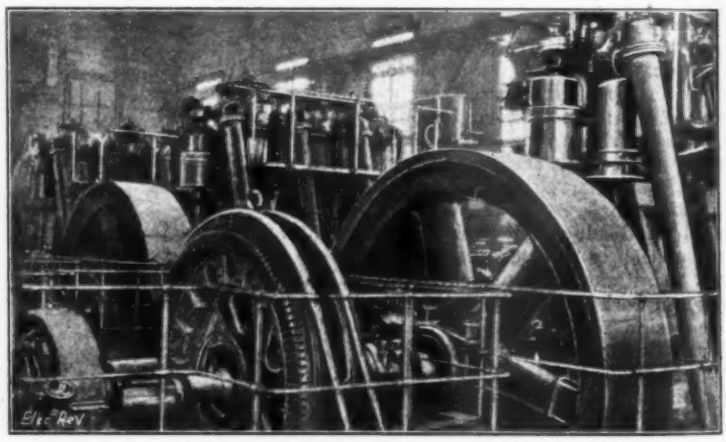


Fig. 3.—Three 180-kW Diesel Sets.

In some plants, special requirements may call for multi-speed equipments for various processes, and also the use of hydraulic power at pressures of up to 250 lb. per square inch. For the former condition a special 2-motor 3-speed push-button-controlled gear has been developed, having a small 1-speed motor for the lowest gear ratio, and a double-wound 2-speed motor for the higher speeds. The whole equipment is controlled from the operating platform by push buttons, and is so interlocked that the sequence of speeds must follow a predetermined order. This gear, however, is now being superseded by a variable speed device, giving, with a constant motor speed, any variation from zero to maximum; this enables the operator to work at the most efficient speed for the material being treated. Hydraulic

power is supplied, both by ordinary duplex pumps and by synchronous motor-driven, multi-stage turbine pumps, the motors being of the self-synchronising type. Electric winches are in use, both for the haulage of raw material to the boiling tanks, and for refuse disposal, and range from the converted steam winch to the modern specially designed gear now to be found in an up-to-date oficina. One of the chief necessities of the "Shanks" process is a supply of low-pressure steam for the boiling tank heating coils, and in bygone years this steam was generated by Lancashire boilers at from 30 to 40 lb. gauge pressure, according to requirements.

Modern practice, however, is to install water-tube boilers operating at 250 to 300 lb. pressure, and up to 250 deg. F. superheat, to supply steam to turbo-alternators, which exhaust into the boiling tank heater circuit at 30 to 40 lb. pressure. In order to obtain the best operating conditions for the turbo-alternators, it is necessary to run them as fully loaded as possible, but the condition may arise that the steam demand in the boiling tank heater circuit is lower than the full-load steam consumption of the turbine. To meet this condition, it is usual to install Diesel engine-driven alternators, which are run in parallel with the turbines, but so adjusted as to allow the turbines to take their most economical load. The heating circuit is a closed one, returning the condensed steam from the boiling tank coils to the boiler feed, but, as the natural well water is unsuitable, a large quantity of this water is withdrawn from the system daily for use in steam locomotives, boilers, and for animals and domestic purposes, and it is therefore necessary to evaporate an equivalent quantity of raw water to make up this loss. This may be done with evaporators, or, as is more usual, a battery of Lancashire boilers is used, which also serves to meet demands for steam above the capacity of the turbine plant which may be on load.

A plant, which is now in the design stage, will provide the necessary water for locomotives and domestic use by means of a condensing turbine of a suitable size drawing steam from the low-pressure steam main. A typical plant of this type consists of three 2,310 square feet heating surface oil-fired Babcock & Wilcox water-tube boilers operating at 210 lb. working pressure, and fitted with superheaters capable of heating to 100 deg. F., which supply steam to two 300-kW turbo-alternators, fig. 1, exhausting at 40 lb. gauge. The Diesel equipment consists of three 180-kW, 3-cylinder, direct-coupled sets, fig. 2. Both turbine and Diesel sets generate power at 460 volts, 60 cycles, 3-phase. Transmission of energy to the well, which is about 10 miles from the oficina, is effected at 6,600 V, the pressure being stepped up at the power house and down again at the well sub-station. In order to provide for emergencies, amongst which, of course, is fire, the well pumping station is equipped, in addition to regular 3-throw pumps, with two multi-stage, motor-driven turbine pumps which may be connected in series, and double the ordinary quantity of water may be pumped, if it is necessary. Low-pressure steam is supplied by a battery of Lancashire boilers, the low- and high-pressure steam mains being connected through a reducing valve to effect stabilisation under all conditions of load, both electrical and steam. The above plant is generating a little over 3,000,000 kWh per annum, at a cost of 0.65d. per kWh.

In some districts, advantage has been taken of water power, and small hydro-electric stations are in operation, transmitting at pressures up to 20,000 V several miles to the nitrate oficinas, and in some cases pumping tail water as well. Altogether, electricity has, without doubt, brought about a cheapening of working costs which has fairly established it as an efficient and economical means of power application, in one of the most conservative industries of the world.

A general view of a typical nitrate oficina power house is shown in fig. 3. The Diesel-driven machines are in the foreground, with the turbo-generators in the rear, and the switchboard is shown on the left.

Electro-Magnetic Sound Recording Machines.

A Wire Recorder Applicable to Radio Broadcasting.

By H. BISHOP, B.Sc., A.C.G.I.

CONSIDERABLE public interest has been created recently in the subject of electro-magnetic recording machines, which may enable a broadcasting company to give programmes of speech or music previously recorded—a development which, when it is perfected, will increase the already great interest in broadcasting.

The Telegraphone Company, of the U.S.A., and the Vox Company, of Berlin, have recently produced electro-magnetic recording machines, and their success has already indicated many uses to which they could be put.

In this article it is proposed to consider, first, the application of the Vox machine for ordinary office dictating purposes, indicating in detail the general and technical conditions involved These being understood, the wider application of the machine to broadcasting problems will follow.

The ideal dictating machine should make the dictator independent of the presence of a stenographer. It should be possible to dictate at any time, and for the work to be copied at any subsequent moment; ideally, it should be no more inconvenient or difficult to dictate to a machine than to a stenographer direct. For this reason it must be possible at any time to interrupt the dictation and to obtain the repetition of any desired part; finally (and this is important) it must be possible for any desired words or sentences to be erased, and corrections made in the appropriate places.

The invention of the phonograph offered a means whereby the spoken word could be recorded and transcribed at a later date, and, in fact, the first dictating machine placed on the market worked on the well-known Edison principle, whereby the sound vibrations of the voice are mechanically recorded on a revolving cylinder or disk of wax, the finished cylinder or disk being re-run to reproduce the speech.

It will be readily appreciated that considerable, nay, almost insuperable, difficulties lie in the way of making such a machine fulfil all the conditions set out above for an ideal machine; the last consideration especially calls for a different type of machine. The Vox Company, of Berlin, has evolved a machine which does fulfil all the conditions, but it works on an electro-magnetic principle, and it can be used equally well for dictating or for recording matter to be subsequently broadcast.

At the beginning of this century the Danish physicist, Valdemar Poulsen, conducted a series of experiments whereby he was able successfully to record speech or musical sounds on a steel wire by causing it to move past the poles of an electro-magnet, the latter being energised by a battery current, the fluctuations of which were controlled by a carbon microphone in the circuit. The fluctuations of the current, and hence the magnetism of the moving steel wire, were, of course, an electrical reproduction of the mechanical vibrations of the voice.

To reproduce the voice or music the microphone and battery in the circuit were replaced by a telephone receiver and the wire was made to move past the magnet poles a second time. The varying magnetisation of the wire passing the pole piece induced across the magnet winding varying e.m.f.'s, which (assuming the linear speed of the wire to be the same as before) produced in the telephone receiver notes of the same pitch as were previously recorded. Poulsen also found that by making the wire sufficiently hard the magnetisation given to it was retained, and therefore that reproduction could be obtained after a considerable period of time had elapsed.* The "quality" or "trueness" of the reproduction will depend chiefly on three things: (1) The uniform hardness or permeability of the steel wire throughout its length; (2) the uniformity of its cross-section; and (3) the constancy of the speed at which it is moved past the magnet, both in recording and reproduction. A variation of any one of the above factors will produce distortion, while serious variations in all three simultaneously may well cause the reproduction to be unrecognisable. Especial importance must attach to these considerations in broadcast reproduction, where a very much higher standard of "quality" is necessary than for ordinary dictating work. Poulsen's invention was put to no practical use at the time, and it can only be surmised that the practical difficulties in the way of satisfying the three conditions given above were

Fig. 1.—The "Speech Unit."

too great. These difficulties have now been overcome, and a machine embodying Poulsen's principle has been perfected by Dr. Stille, of the Vox Company.

As mentioned above, in an ideal dictating machine it must be possible to erase any portion of the recorded matter and substitute a correction. How can this be accomplished? If the wire on which the speech has been recorded is run past the poles of an electro-magnet, energised by d.c., before it passes the poles of that to which the telephone receiver is connected, then nothing will be heard, as the original magnetisation given to the wire will have been wiped out, and a fresh "impression" can be made by speaking into the microphone again. It will also follow that the wire can be used an infinite number of times, for, as soon as any dictation has been copied and is no longer required, the original magnetism can be wiped out by running the whole wire past the d.c. magnet. We need no new records!

The dictating machine itself is in two separate parts, which may be called the "speech unit" and the "copying unit." The first will generally be situated in the dictator's room, while the second will be in that of the typist; the two must be connected by the necessary length of multi-cored cable, which can be quite small, as no large currents are to be carried by it. The "speech unit" is essentially a remote control device for the "copying unit," containing the moving wire, the motor to drive it, and the magnet systems, &c. It consists of an ordinary desk telephone set, fig. 1, with a handset comprising a microphone and telephone earpiece mounted on the top. In front is an indicator with two pointers which revolve like the hands of a clock, showing whether the steel recording wire is moving, and its exact position. At the base there are four buttons: The first three, controlling the motor, are labelled "Forward," "Stop," and "Backward"; while the fourth, labelled "Call," is an alarm to draw the attention of the typist who may actually be copying at the moment when it is desired to give further dictation. There is, further, a "Press to speak" switch on the handset which connects the microphone in series with a battery to the recording magnet, and at the same time switches a battery on to the erasing magnet which the moving wire passes before it reaches the former. Thus, previously recorded dictation is automatically erased before a further record is made. The releasing of this switch also connects

Fig. 2.—The "Vox" Dictating Machine, or "Copying Unit."

directly to the recording magnet winding the telephone earpiece of the handset, instead of the microphone and battery. It follows, therefore, that the "Press to speak" switch must not be closed if the moving wire is being run through with the object of listening to a previously dictated letter.

The "copying unit," the construction of which can be seen from fig. 2, consists of a desk with room for a typewriter and position for the stenographer on the left, the "recorder" itself being built in on the right. This is composed of two large pulleys which, together, hold the moving wire—some six miles of hard steel wire 0.25 mm. in diameter—and are driven by an electric motor. The wire runs from one pulley between the poles of the erasing and recording magnets round a small pulley at the back and then on to the second large pulley. As the wire has to be run back before it is possible to listen to a dictation, switching is incorporated for cutting in and out a resistance so that the wire runs backwards much faster than forwards, and thus time is saved.

In addition, the desk contains various relays for remotely controlling the motor, the drive to the pulleys with its gearing, and also small dry batteries and accumulators for the microphone, alarm bell, and relays. There is, further, an indicator which shows the position of the wire and runs synchronously with that on the "speech unit." To the immediate right of the typewriter is a small switch box, which provides for the local control of the machine, and is similar to that provided on the "speech unit." When the machine is in use, and the dictator presses the "Call" button, a signal will be heard by the typist, who can stop and,

* Full descriptions of the Poulsen "Telegraphone" were published in the ELECTRICAL REVIEW of April 27th and October 12th, 1900, and May 10th, 1901.—EDS.

by operating a switch, bring the remote control into action for fresh dictation. There is one extra button on this control unit, labelled "Repeat," which is used as follows: Foot controls for "Stop" and "Start" are provided in parallel with the respective push buttons so that the typist's hands are free, and, when copying, a few words would be listened to, the machine stopped and those words typed; the machine would then be started again and more listened to, and so on. Moreover, if the "Repeat" button is pressed, each time the machine is started the last word of the previous group will be repeated, thus rendering it impossible to miss a word. The telephone receivers provided are worn on a headband as are ordinary headphones for "wireless" reception.

Briefly, the method of using this machine for dictation is as follows: The dictator takes up his hand-set and presses the "Call" button. If the stenographer is copying at the time, the call will be heard in the headphones, copying will be suspended, and the wire run through to a position where it can be used, the signal to start being given with the "Call" button. The dictator then presses his "Forward" button, and will see by the small hand of his indicator that the machine is running, and by the large one (which runs more slowly) where his dictation will start on the wire; later, of course, it will indicate the finish. The stenographer can also note the start and finish by the indicator on the "copying unit," and thus will know where the wire must be started to copy each piece of dictation.

The dictator next presses the "Press to speak" switch on his hand-set and speaks his dictation into the microphone. If he wishes to pause it is only necessary to press the "Stop" button, when the motor will stop; to start again the "Forward" button is pressed, and the dictator can proceed. If a repeat is desired, the "Press to speak" switch must be released and the "Backward" button pressed, when the wire will run back quickly until it is stopped by pressing the "Forward" button at the desired point, shown by the indicator pointers, when the wire will move forward again and repeat the already dictated portion. If a mistake is discovered, it is only necessary to run the wire back past the point and set it going forward again; then, at the appropriate moment, to press the "Press to speak" switch and speak the correction into the microphone. At this instant the errors will be erased and the correction recorded on the wire.

Here it may be mentioned that the six miles of wire provided takes about an hour to run through, so that dictation of considerable length can be undertaken. The dictation is concluded by pressing the "Stop" button, and placing the hand-set on the rest.

At the "copying unit" end the indicator will show how dictation is proceeding. The stenographer, wearing the head telephones, operates the machine for copying as follows: The switch is put over to "copying unit" and the wire run back (by pressing the "Backward" button) until the desired place is reached, further control of the machine being by the two foot pedals—that on the right starting the wire and that on the left stopping it. When the copying is completed the stenographer has only to run the wire back to prepare the machine for further use.

There are no "records" to change, the same steel wire being always available. Power for the motor is obtainable from the mains, while the dry batteries, &c., will last several months. The upkeep costs are therefore negligible, and it will be apparent that by a simple exchange system one copying unit could be installed in the stenographer's office, while a "speech unit" might be provided in each of several offices, thus permitting the use of the machine by several members of the staff—in each case from their own offices. Such facilities are not provided by the standard model.

Having dealt in detail with the dictating machine *per se*, we may now turn to its application to the purposes of broadcasting. It will be realised that its uses are manifold: First, an actual broadcast programme can be recorded and reproduced at a later date. This may be either a concert or some event of national importance, such as the opening ceremony at Wembley. This could be done either by the broadcasting authority, in which case the performance could be broadcast again, or by the listener, in which case he only could repeat it through his own loud speaker or headphones.

Secondly, it will enable a programme given in one place to be recorded and re-transmitted from another place, the wire containing the record being dispatched like a kinematograph film. In this way programmes could be exchanged internationally, and British listeners could be given an American programme without the almost invariable accompaniment of fading and atmospherics to which "wireless" relaying is subject! Thirdly, the recording machine provides a simple method of confidential transmission, which may be accomplished by recording the message on the steel wire. Transmission is then effected by reversing the travel of the wire, the message thus being rendered wholly unintelligible, until, at the receiving end, the message is recorded on a similar machine and the necessary reversal carried out.

The recorder already described requires several modifications to adapt it to broadcasting purposes. The remote control unit can be dispensed with and the so-called "copying unit" installed in the control room of the broadcasting station. The ordinary carbon microphone would be replaced by the studio microphone equipment for recording local programmes, or by a "wireless" receiver, or telephone line for recording those of a distant station. The steel wire must be capable of removal from the machine, and as it has to be carefully handled if it is to preserve the record, it should be removable without detachment from its spools. For re-broadcasting a previously recorded programme the recording magnet winding would be connected through amplifiers to the "wireless" transmitter, which would replace the headphones.

The Vox Company has also produced a smaller machine, which, while it can be used as a dictating machine, has provision for application to broadcasting purposes as outlined above. A smaller amount of wire is provided, and the two spools are mounted so that they can be removed instantly with their bearings, &c.—in fact, the operation of changing wires is as simple as that of changing a gramophone record. Further, as soon as the spools are removed from the machine with their carrier they are automatically locked, so that it is impossible for the wire to unwind and get kinked.

The writer recently had the experience of hearing a demonstration of these machines for purposes of both dictating and broadcasting. The reproduction of speech was excellent, but that of music left something to be desired. The latter, of course, requires a much higher standard of perfection, but further experimental work, which is still in progress, will doubtless result in this standard being attained. It is hoped that the time is not far distant when British listeners may have the opportunity of testing the success of reproduction by these electro-magnetic machines.

The author desires to express his thanks to the Vox Company, of Berlin, for its courtesy in allowing the publication of the accompanying illustrations and for supplying information regarding the machines.

City of Winnipeg's New Steam-driven Plant.—Tests on the plant of the new steam-driven electricity generating station at Winnipeg, which serves as a stand-by to the city of Winnipeg hydro-electric system, were recently carried out under the supervision of Professor N. M. Hall, of the Manitoba University. This new up-to-date station has three boilers fired with pulverised coal installed by Combustion Engineering, Limited, and two electrically-heated boilers installed by the Canadian General Electric Co., Ltd. The engine-room contains two 5,000-kW turbines, and one of 1,000 kW, all running at a speed of 3,600 r.p.m., manufactured by James Howden & Co. Glasgow. These turbines are coupled to Parsons alternators, and are supplied with steam at 220 lb. and 150 deg. F. superheat. The larger turbines exhaust into Hick, Hargreaves condensers, and the 1,000-kW set is a back pressure unit and exhausts into the hotwell. Each day all three turbines are run up to speed to ensure that everything is in order, and once each week they are put on the line. The boilers supply the central steam heating system of the city, and sufficient steam is always available to meet a sudden call for the stand-by plant.

The International E.H.P. Conference.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

(*Concluded from p. 7.*)

In the second part of Group (I) of the papers read at this Conference the following were the more interesting features:—

Insulating Oils.—An excellent review of the research work carried out in Great Britain was given by Mr. A. R. Everest. Incidentally he mentioned that rheostat oil required a very high flash point, and further that oil for electrolytic arresters must be free from any tendency to emulsify with the electrolyte. The discussions on the subject generally were rather disappointing, as they tended to hark back to old ground rather than to venture into new pastures. However, it is work that the I.E.C. has well in hand.

Outdoor Sub-stations.—France has now no fewer than 89 open-air equipments on a fairly large scale. Mr. Planteau gave an excellent *résumé* of progress made during the last two years, illustrated with the ingenious coloured stereoscopic views to which reference has already been made. Some very interesting modern bus-bar arrangements were described.

Test Pressures.—This is again a somewhat hackneyed subject, which nevertheless always arouses considerable discussion. Still no progress was made. It was decided to transmit a report of the discussion to the I.E.C.

Ironclad Switchgear.—Two most interesting papers were read by Messrs. R. W. Gregory and H. W. Clothier (the latter illustrated with a kinematograph film). Both contained matter that was novel to most Continental engineers, and were admirable expositions of modern practice. Further, both papers were well illustrated.

Group (II) of the papers presented dealt with the following matters, under the general heading of the construction and insulation of transmission lines: line construction generally; posts; insulators; cables and conductors; and the prevention of damage to electrical installations by earthquake. This last item was of a most novel and interesting nature, for detailed particulars were given in a paper of 118 pages of the damage caused to Japanese installations by the recent terrible convulsions. Though one and a half million electric lamps were destroyed, 900 electric tramcars burned by fire, and several tens of thousands of kilowatts of plant put out of commission, in five months the demand for electricity had recovered to that of pre-earthquake days. As the result of a careful analysis of the damage done, new rules have been drawn up, which it is hoped will greatly mitigate any adverse results of future earthquakes to electrical installations.

In this particular group it was disappointing that Great Britain did not present any papers that supported an industry in which she is far ahead of other nations, *viz.*, cable manufacture. The stock arguments that there is nothing very new in cable design, and that everyone knows that England makes the best cables, are not good enough. Foreign engineers are becoming very interested in the subject, but fear to use cables as much as they might, owing to lack of experience in laying and maintaining them, &c. Their views on the earthing of the neutral, protective apparatus, and the like, as disclosed by the discussions, are much behind British practice. It is to be hoped that this important section of British industry will be well represented on another occasion.

Overhead Lines.—Very often approximate data are required for a preliminary idea as to the type of overhead line that should be employed. Some very useful notes in this connection were given in a paper by Mr. E. V. Pannell. The Italian delegation, through Mr. L. Maggi, presented a very useful report upon the practice of that country in overhead e.h.p. line construction, including wide river crossings. Though there is insufficient space to deal here with the general subject as discussed at the Conference, it may be well to draw attention to the very great progress that is being made. It is far greater than many British engineers—unaccustomed to this class of work—are apt to think.

Poles.—Of particular interest were the papers on concrete pole construction. According to Mr. P. Ferrier, concrete poles are economical for lengths less than 60 feet or over 80 feet (steel towers being cheaper for lengths of from 60 to 80 ft.). The centrifugal process of constructing ferro-concrete poles was described by Mr. C. Montagni. This process is carried out in revolving moulds, which cause a previously prepared conical reinforcement to be covered with a homogeneous layer of concrete, both externally and internally. In this way the reinforcement is properly centred.

Insulators.—Mr. A. O. Austin drew attention to the fact that there are now two main schools of thought as regards dealing with electrical flashes-over on overhead lines. The one believes that it is impossible to prevent them, and therefore that attention should be concentrated on controlling the path of the power arc to the ground. The other school considers that electrical flashes-over can be prevented by raising the flash-over voltage of the system. This seems reasonable, as losses increase very rapidly with voltage, so that a slight rise in the flash-over voltage of the system may cause surges to be dissipated without reaching a voltage sufficient to strike an arc to ground. For some years past the insulator has been considered to be the chief source of trouble on a transmission line. To-day it appears as if the conductor is likely to cause more trouble than the insulators. The method of employing insulated controls at the conductor end of link suspensions was described in this paper. These controls merely consist of a bowed arm, the external ends of which embrace, but do not touch, the last insulator of the suspended chain. This method has given excellent results on the lines of the Consumers' Power Co., Jackson, Michigan; the Illinois Power Co.; and the Penn Public Service Corporation.

Cables.—Mr. L. Emanueli described the 130,000-volt three-phase cable recently laid in Italy. It is laid as three single cables, each 600 metres long (with two joints in each length). The cables are hollow, and insulating oil is placed in the interior, expansion chambers being provided at the ends. This development is looked upon as of importance, as it will enable e.h.p. lines to be carried by cable through congested areas.

Group (III) of the papers—the development of the transmission system—covered the effect of earthing the neutral of transmission systems on telephone and telegraph lines; telephonic communication between power stations; surcharges, surges, atmospheric and other transitory phenomena in connection with high-pressure lines; measurement of energy and losses; power factor; standardisation of pressures; regulations for high-pressure lines; accidents and breakdowns; rural distribution and electro-farming.

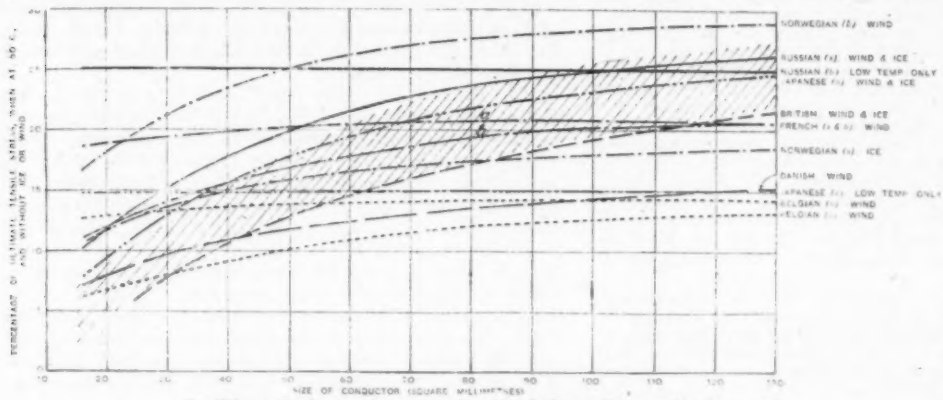
Télécommunication is the joint French word that refers to both telephony and telegraphy. It is a word that is missing, though needed, in the English language. The general tenor of the discussion was that all difficulties that had arisen so far could be overcome. The chief difficulty was the cost. It appeared that the Governments of most countries were co-operating with, rather than laying down regulations for, the providers of electricity to ascertain the most economical solutions.

The klydonograph was the name of a newly developed instrument, described by Mr. Peters, and employed for measuring abnormal voltages of a transitory nature on transmission systems. It consists of a clockwork-operated photographic film (so as to obtain records over a week) in contact with which are discharge points.

On development of the film, figures appear that give pertinent information concerning the nature of the voltage impressed. This device has already proved its merits in operation.*

Statistics on Accidents.—A very detailed report was presented by the I.M.E.A., in reply to a request circulated by the Council of the Conference, asking for information on this point. Apparently the majority of short-circuits are due to vermin and workmen's picks. Similar reports were also presented by the Dutch and the Swiss. While these escape the troubles due to workmen's picks, in their stead they have to contend with the troubles of thunderstorms.

Regulations for Overhead Lines.—Five countries reported upon this subject. A most interesting summary of the practice in many countries was given by Mr. G. V. Twiss. This paper was accompanied by a diagram, which is reproduced herewith. A similar paper was presented to the I.E.C. conference at The Hague (see ELECTRICAL REVIEW, p. 727, May, 1925).


NORWEGIAN (b) WIND
RUSSIAN (a) WIND & ICE
RUSSIAN (b) LOW TEMP. ONLY
JAPANESE (b) WIND & ICE
BRITISH WIND & ICE
FRENCH (a & b) WIND
NORWEGIAN (a) ICE
DANISH WIND
JAPANESE (a) LOW TEMP. ONLY
BELGIAN (a) WIND
SWEDISH (a) WIND
SIZE OF CONDUCTOR (SQUARE MILLIMETRES)

Conditions: Conductors strung to various Regulations; all external load removed, and temperature raised to 50° C; span, 150 metres.

Curves showing Stress remaining in Stranded Copper Conductors.

From this chart it will be observed that the graphs tend to fall into two groups, (*a*) rectilinear, and (*b*) hyperbolic. Of these the British I.E.C. Committee appears to consider that the hyperbolic curve is the one that most closely represents the conditions required to meet practical working needs. The reason for this is that this curve takes into account the observed tendency of smaller lines to fail when erected to the equivalent loadings of the larger ones, whilst at the same time it also eliminates excessive precaution in the case of the larger sizes of conductors. A shaded band or zone is indicated on the figure. The idea of this is to represent arbitrarily by the lower boundary of the zone the loadings sufficient to safeguard lines under severe climatic conditions; on the other hand, the loadings indicated by the upper boundary correspond to the conditions occurring in countries with equable climates. The formula calculated for these loadings is:—

$$A = M\,(2.25 \times .052\,D^{1.35})$$

where A = added load in kg./m length,
D = overall diameter of conductor in mm.,
and M = a constant dependent upon the climatic conditions.

Electro-Farming.—Two papers were presented on this subject, one, by M. Fukuda, describing the progress that was being made in Japan in this direction. Some very interesting comparative figures were given as to the relative costs of the use of electricity, steam, and oil engines on the farm. Considerable attention is given to irrigation in Japan. Novel uses of irrigation water are for destroying (*a*) obnoxious insects, (*b*) destructive worms, and (*c*) weeds. The other paper, by the present writer, dealt with the lay-out problem for rural e.h.p. lines. Attention was particularly drawn to the fact that rural line calculations should always be based upon miles or kilometres of route, instead of upon the area of supply—as is usually done by those antagonistic to the idea. It was pointed out that there was now ample evidence that when rural areas, with at least one-third of the land under the plough, were handled properly they were remunerative. This paper was illustrated with a kinematograph film to demonstrate the possibilities of using electricity on the farm. To illustrate one method of educating farmers, a propaganda magazine, now issued in England, was distributed.

In Conclusion.—The next Conference is to be held in 1927, at Paris. A full report of the proceedings will be published in French in the autumn. It will be published in English if only 1,000 copies are ordered.

A resolution was passed at the final proceedings asking each country to form a special committee—as was done in Great Britain last year—to make the necessary preparations for representing each nation's work in an adequate manner.

Dr. C. O. Mailloux (U.S.A.) was charged with the preparation of a report upon the economy of the use of various fuels by various nations, ready for the next Conference. Mr. Norberg Schulz (Norway) is to form a committee for establishing in every country a uniform basis for statistics concerning the production, transmission, and distribution of electrical energy and the economics thereof. Questions relating to insulating oils and test pressures were referred to the I.E.C. Insulators are also to receive special attention at the next Conference.

The proceedings terminated with a special vote of thanks to the President of France (M. Doumergue) for the very kind way in which he had shown his interest in the distribution of electricity.

*For a description of the instrument see ELECTRICAL REVIEW, May 9th, 1924, p. 770.

The First International Congress of Radiology.

AN International Congress of Radiology was held at the Central Hall, Westminster, from June 30th to July 4th. It was organised by the three radiological societies of Great Britain, namely, the Roentgen Society, the Electro-Therapeutic Section of the Royal Society of Medicine, and the British Institute of Radiology. The President of the Congress was Mr. C. Thurstan Holland, and it was decided to constitute it the first of a series of triennial Congresses.

The official opening by the Duke of Connaught took place in the afternoon of Wednesday, July 1st, but actually the various sections of the Congress had started work in the morning. There were some 500 delegates from all over the world, and in connection with the Congress, an exhibition of radiological apparatus was held.

The DUKE OF CONNAUGHT, before declaring the Congress open, recalled that it was just over 30 years since Roentgen discovered X-rays, and said it was an eloquent tribute to his discovery that in the year 1925 such a large body of scientists and medical men should meet to discuss the many directions in which the science of radiology had developed. In addition to the value of X-rays in fighting disease, their use for the detection of faults in steel was an established procedure, whilst X-rays were also used for the detection of faults in wood used for the construction of aeroplanes, for determining the structure of coal, &c. One of the most recent developments was the step taken by the British Red Cross Society in the use of mobile X-ray units which could be taken to villages and out-of-the-way places for the treatment of persons who would otherwise not be able to obtain it, and such was the perfection which had been reached, that these portable X-ray units were as good as many of the permanent ones in the large hospitals. After a reference to the objects and aims of the recently formed British Institute of Radiology, His Royal Highness spoke of the use of radium in conjunction with X-rays in the treatment of malignant disease, and with reference to the Ministry of Health's inquiry into the treatment of cancer by this means, expressed the hope that the outcome would be sufficiently encouraging to warrant further large supplies of radium being placed at the disposal of the medical profession.

Mr. NEVILLE CHAMBERLAIN, Minister of Health, who welcomed the delegates on behalf of the Government, also referred to the inquiry into the treatment of cancer, and spoke of the scarcity and high cost of radium, sufficient quantities of which under present circumstances were hard to find.

The Congress was divided into several sections, and we commence below a short account of the items of special interest to our readers.

International Units and Standards.

The whole of Wednesday, July 1st, was devoted by Section I (Physics), and Section III (Radiology), to a discussion upon international units and standards for X-ray work.

SIR WILLIAM BRAGG, F.R.S., who opened this discussion, said the problem of arriving at international units and standards for X-ray work was beset with more difficulties perhaps than was the choice of any other unit which science had ever had to devise. There were the difference between quantity and quality, the difference between the amount of energy and the wave-length which carried it, and the continual difficulty of the scattering of the X-rays and the formation of other beams which had to be taken into account. In Germany a Congress had been held at which definite resolutions had been passed as to the best means to be adopted. In England also there was a Standing Committee formed by the Physical Society and the Roentgen Society which had been considering the question, but the work done only served to emphasise how complex a question this was. The whole thing was a matter of compromise, and looking at it broadly there were three things to be considered. First of all, there was the determination of the scientific unit; secondly, there was the determination of a standard piece of apparatus which could be used for comparison, and, thirdly, there was the comparison of the results obtained under treatment with the standard. The first two were largely matters for physicists, whilst the third was entirely a hospital matter. It was no use, however, carrying any one of these three questions to completion and leaving the others in a state of incompleteness or indefiniteness. All three must be attacked together.

Mr. A. BECLERE (France) expressed the hope that an endeavour would be made to find a physical unit for dosage which would be recognised and adopted by all radiologists in all countries rather than a biological unit. Perhaps the best course to adopt would be for the Congress to constitute an International Committee for the study of this very important question.

Dr. I. SOLOMON (France) suggested that the ionometric method constituted the best for the measurement of Roentgen rays and expressed the view that the Behnken unit adopted in Germany, although satisfactory in many respects, had certain difficulties of technique which were likely to prevent its general adoption. He preferred the notation in R units which he had devised and which had been used in France for four years.

Prof. H. MARTIUS and Prof. L. GREBE (Bonn, Germany) spoke of the difficulties introduced by secondary radiations in endeavouring to arrive at standards for international units, and referred to experiments which showed that the scattered radiation might be many hundreds per cent. in excess of the primary radiation.

Dr. W. ALTSCHUL (Prague) urged the necessity for standards which would enable a dosimeter to indicate at any moment of the radiation, the actual dose which was being given.

Dr. J. H. SHAXBY (Cardiff), speaking on behalf of Dr. A. Dauvillier, of France, described apparatus for standardising dosimeters, and urged the adoption of physical units in arriving at standards rather than biological units.

Dr. N. S. FINZI (London) seconded the proposal of Dr. Béclère for the appointment of an International Committee to determine the unit of X-ray dosage. One of the first things which it would have to determine was whether a physical or a biological unit should be adopted. The best method in the general interests should be adopted and no questions of priority of work on the problem in any particular country should hamper a decision.

The proposal was carried unanimously, and the Chairman promised to bring the matter before the general meeting of the delegates later.

Dr. H. MOORE (London) said that it would be an important step towards a solution of the problem of measuring X-rays if radiologists were provided with generating apparatus with which they could, at any time they chose, obtain an X-ray beam of definite quality. Suppose, for example, they could have a battery of cells giving 200,000 volts and could connect that across an X-ray tube and could pass through that tube 10 milliamperes, they would be fairly certain of getting the same type of X-rays from that tube one day after another. The important thing was to get a constant voltage. Therefore, he suggested what was perhaps rather revolutionary, namely, that radiologists should scrap their present apparatus and install as rapidly as possible constant-voltage apparatus. The only thing required was the money, because such sets were on the market. A voltmeter which could be depended upon should be used. With such apparatus as he had suggested in common use throughout the world, a mass of information could be accumulated which would be of enormous use for comparative purposes and would assist the adoption of international standards.

(To be continued.)

A Visit to Messrs. Johnson and Phillips's Works.

A Jubilee Celebration.

ON Friday last, to mark the completion of half a century's continuous activity in connection with electrical engineering, the firm of Johnson & Phillips, Ltd., entertained a large party of journalists to luncheon at its works at Carlton, and afterwards conducted the guests through the various departments of the factory which has grown up round the original workshop that was built in 1875 to manufacture telegraph cable and accessories. The products of the company now include cable-handling machinery for cable steamships; cables for electric lighting and power and for telephony, of numerous varieties; cable-making machinery, transformers, switchgear, instruments, and overhead line equipment, and from the appearance of the workshops it was evident that an abundance of work was passing through them.

At the luncheon Mr. J. Macgregor, managing director, occupied the chair, supported by Sir Philip Dawson, K.B.E., M.P., Mr. H. J. Sheppard, Mr. C. Stewart, and other members of the directorate and staff.

After the toast of "The King" had been honoured, SIR PHILIP DAWSON proposed "The Press," to which he admitted he had himself been a contributor on many occasions. From his experience in various countries, he declared that there was no fairer or more honest Press than that of this country, and his political career had taught him that it exercised the greatest possible influence. Coupling the toast with the name of Mr. E. A. Gatehouse, Sir Philip said that his father, the late Mr. Tom E. Gatehouse, was one of his dearest friends, and introduced him to journalism many years ago.

Responding, Mr. GATEHOUSE recalled the good advice Sir Philip gave him when he left college and was about to start practical work—to enter an engineering workshop. The firm of Johnson & Phillips had been associated with the ELECTRICAL REVIEW for nearly the whole of its 50 years' existence; it was a privilege which the Press appreciated to take part in the celebration of such a jubilee, which was especially noteworthy at a time when industrial difficulties were rife. The prosperity of the firm bore witness to the foresight and determination of the men in charge of its destinies. On behalf of the Press he cordially congratulated the directors and staff, and wished them the greatest possible success in the future.

Mr. J. W. BEAUCHAMP, director of E.D.A., proposing the health of "The Firm," remarked that few electrical concerns had yet celebrated their jubilee. Thirty years ago the company was producing everything required by an electricity supply undertaking; he had had experience of the quality of its products at Tunbridge Wells, and found them all very good. Now the company had concentrated upon the production of everything essential to transmission and distribution. It was not yet fully realised that the distribution problem was every year increasing in importance; the cost of distribution must be reduced, and they must get more units through every thousand pounds' worth of plant. Immense quantities of copper were being put underground: they must get a higher duty out of that copper. Upon success in that direction the cheapness and abundance of electricity supply depended even more than on economies effected in the power station. A tour of such a factory as that of Messrs. Johnson and Phillips was of great educational value.

Mr. MACGREGOR, responding to the toast, said that 50 years ago they could not have looked forward to such a gathering; it had been a hard struggle for all electrical firms. He believed in old faces—but they must have young blood, and the success of the firm was largely due to its having always been ready to give young men a chance to make good. The firm was founded by Mr. W. Claude Johnson and Mr. S. Phillips, and was made a limited company in 1905. The period from 1904 to 1908 was a very bad time, but they weathered the storm, and to-day they were fairly satisfied with the success they had attained. He knew it paid to advertise; in the early days the Press was rather dependent on the manufacturers for support, but now they could rely on the support of the Press—it was sometimes critical, but always with goodwill. He could tell them a good deal about their first Gramme dynamo, their first arc lamp, their first cable, for they were pioneers. Fortunately the keen competition formerly met with in this country had been broken down, allowing them to make a little profit which could be devoted to research and enabled them to keep up to date, as would be seen in the shops.

A lengthy tour of inspection of the shops then took place, ending with a visit to the test room, where tests were carried out on cables at pressures up to 190,000 volts, without breakdown. The test-room equipment for the accurate measurement of dielectric losses in high-pressure cables, and for the determination of cross-talk and capacity in telephone cables, was especially interesting.

Electricity in Factories and Workshops.

H.M. Electrical Inspector's Annual Report.

THE annual report of the (Home Office) Chief Inspector of Factories and Workshops for the year 1924 has just been issued.* Chapter IV, which is devoted to the report of the senior electrical inspector, Mr. G. Scott Ram, M.I.E.E., is abstracted below: It is pointed out that at no time since electrical stations first became "factories" in 1902 has the development of the electricity supply industry been so active. The number of transforming and distributing sub-stations is greatly increasing, and they are generally satisfactory; cases have, however, been found where the work has been entrusted to contractors new to this class of work, who have obtained it by quoting very low prices and serious mistakes have been made involving grave risks to the persons who subsequently have to operate and maintain the plant.

The divisional electrical inspectors have been very active during the year, and their reports are of much interest and value, but it is impossible to quote more than a few very brief extracts. Mr. Swann (southern area), in dealing with various supply undertakings, refers to some which, being originally of small importance, have relied on being able to shut down for cleaning or other work on the switchboards, but now find themselves in difficulties through failure to commence sectionalisation of switchgear in the early stages, it being now a difficult and expensive matter to deal with. He refers also to the varying attitudes adopted by engineers of different undertakings; some co-operated heartily, and considerable improvement has been effected, but in other cases the management is not sympathetic.

In two large works being erected for a new industry by Continental firms, the open type switchgear was hopelessly mixed up with the factory process plant and otherwise contrary to the regulations, necessitating very considerable alterations. Special attention has been paid to various brickyards recently electrified, and Mr. Swann has been able to secure that the lighting pressure shall not exceed 110 volts alternating for the numerous portable lamps used at the kilns under very trying conditions of rough usage, exposure to weather and heat.

In electric lamp and radio valve works, where very high pressures are used, he has been able to obtain extensive and far-reaching precautions to suit the particular processes without interfering with output. At the request of the directorate of the British Empire Exhibition, a good deal of inspection work was carried out at Wembley in connection with the electrical exhibits.

Mr. McColgan, after describing large extensions of public supply in the northern area, refers to the excessively rough usage to which electrical plant is put in such places as steel works by reason of the unskilled labour employed. Master controllers and contactors could with advantage be utilised for controlling other than large mill motors, thereby taking out of the hands of the unskilled operator the sequence and speed of operation. In some of the steel works engineering and shipyards, the system of maintenance is very good, but in others the tendency appears to be to wait until apparatus actually breaks down. False economy in electrical staffs whereby the staff cannot possibly carry out all the work expected from it, is responsible for some of these deficiencies. Fuses which do not comply with the regulations are still very numerous and responsible for accidents. There is undoubtedly an extensive field for a small type of circuit-breaker at a competitive price, as a substitute for the larger fuses.

It frequently occurs in factory installations that the occupier leaves his electrical arrangements to a contractor, and is surprised to learn after inspection that he has a very third-rate job that is not in order. In certain cases Mr. McColgan interviewed the contractors, whom he found to be entirely ignorant of the regulations. Similar observations apply sometimes to works' electricians who are responsible for much bad and dangerous work. An installation to comply fully with the regulations, if properly thought out, should cost little if anything more than one in which there may be many irregularities. Much apparatus, not in compliance, is installed through ignorance and many firms would save considerably by employing an experienced consulting engineer.

Mr. Brown (North of England area) reports that electric driving is making rapid progress in the woollen and worsted industry, more so than in the cotton industry, and great improvements are taking place in the standard of industrial lighting. In some installations the illumination has been increased several-fold with very little increase in the energy consumption, and unexpected results are sometimes found, showing that efficient lighting of the work is not the only aspect to be considered.

Whilst a distinct improvement is noticeable in the quality of work in factory installations generally, some recent installations demonstrate a deplorable lack of engineering knowledge and of the requirements of the regulations. There is still a tendency for small contractors to use light gauge close-joint conduit and grip fittings for large power installations, for which they are quite unfitted; cleat wiring well installed, with the conductors protected where liable to damage, is far preferable to a cheap conduit system. Faulty designs of apparatus are still turned out by some manufacturers, *e.g.*, star-delta starters with fuses so placed that the whole of the live parts have to be exposed in order to get at the fuses, and switch lampholders having live switch spindles. Many contractors do not realise the necessity for placing single-pole switches in the live wire on systems where one pole is earthed, and some supply authorities are also very lax on this point.

The accidents reported during the year numbered 433, including 27 fatal cases, compared with 361 and 21 fatal cases in 1923. The proportion of fatal accidents is slightly greater. Of 37 accidents on high-pressure or extra-high-pressure systems only six were fatal. (Twenty-three of them, three fatal, occurred on public supply systems to employés of the supply undertakings.)

One of the most fruitful sources of serious accidents (96 cases, 21 on h.p.), is that of persons working on live switchboards or other apparatus, thinking that the conductors were dead; some cases are quite inexcusable. Many accidents on h.p. apparatus are due to mistakes which could be avoided by the rigid observance of a rule to test all conductors, even if "known" to be dead, and then earthing them.

The next largest class of accidents concerns the use of portable apparatus in which there were 72 accidents, all at low pressure. In 48, or two-thirds of them, the injuries were burns from short circuits, and in the other 24, including 5 fatal cases, the injuries were from shock. Half of this class was due to the use of poor quality or worn-out flexible; a dozen occurred at electric irons, due to short circuit at the point where the wires leave the iron close to the operator's hand.

Thirty-six accidents, including one fatal, occurred in the testing departments of electrical manufacturing works; twenty (three fatal) occurred in connection with electric cranes, and inadequate protection of cables and wires in factories accounted for four fatalities. The greater number of fatalities, including all those in the ordinary use of electricity, as distinguished from generation and distribution and in electrical manufacturing processes, occurred as usual on a.c. circuits where the pressure to earth or pressure of shock did not exceed low pressure; there were 17 such fatalities at low pressure.

During the year a number of further changes in public supply systems from direct to alternating have been put in hand. In the case of a supply to factory premises, such a change necessitates compliance with a number of the regulations from which the factory had previously been exempt, and rightly so on account of the increased dangers. There are many d.c. installations which may have been in use from twenty to thirty years which are quite unfit for use with alternating current.

Prosecutions, mostly following on serious or fatal accidents due to breaches of the regulations, were taken against 12 occupiers in respect of 26 offences; penalties varying from 20s. to £95 were imposed on 21 summonses. Three were withdrawn, and two dismissed on payment of costs. In one case the occupier took out a cross summons against a foreman under Section 141; the foreman admitted his neglect in not completing the earthing of certain apparatus, in consequence of which a fatal accident occurred. In view of his own distress over the matter he was merely admonished.

* H.M. Stationery Office; price 2s. 6d. net. Cmd. 2437.

Condenser Water from Lower Lake Levels.—How large power plants could save thousands of dollars in summer coal bills by tapping lower levels of lake water, was the subject of a paper read before the American Society of Mechanical Engineers recently by Professor A. G. Christie, of which *Science-Supplement* gives some interesting details. By placing intakes for cooling water for use in condensing steam so that they would reach the cold bottom layers of the northern lakes, Professor Christie showed that water from 10 to 20 deg. colder could be obtained. With this colder cooling water additional vacuum could be created in the condenser, with a resulting decrease in steam consumption, which he estimated would be equivalent to a saving of $36,956 in about 4½ months' operation of a 100,000-kW plant.

Manchester Association of Engineers.—On July 1st, some 150 members of the Manchester Association of Engineers visited Lincoln to view the various engineering works of Messrs. Ruston & Hornsby, Ltd. The visitors were received by Col. Ruston and his co-directors, who, with the staff, conducted them through the various departments. The works are principally employed in the manufacture of oil, gas, and steam engines, traction engines, boilers, and all classes of agricultural machinery. During luncheon the chairman gave a hearty welcome to the visitors, and a hearty vote of thanks was accorded to the company for courtesies extended and hospitality shown to the party. After tea the visitors proceeded to Lincoln Cathedral, where the principal architect explained the work now being done to prevent the building from falling into decay.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

The Balfour Committee.—On June 29th, in reply to Mr. H. WILLIAMS, who asked when he anticipated receiving the first interim report of the Balfour Committee on Trade and Industry, Mr. A. M. Samuel, Secretary to the Department of Overseas Trade, said he was informed that a first volume entitled "Surveys of Overseas Markets," was about to be published. The volume was based on material furnished to the Committee from official sources, with an introduction by the Committee. It would not contain the Committee's recommendations, as they could not be formulated until it was able to consider the effect of the evidence as a whole. The Committee had received by now most of the evidence which it proposed to take but the representatives of certain important organisations remained to be heard.

Railway Electrification. — On June 30th, Mr. R. SMITH asked the Minister of Transport if the Government intended to take any steps with regard to the electrification of the main railways.

Col. ASHLEY said that the Government was considering the whole question of electricity. It might be assumed that any improvement in the supply and distribution of electricity would facilitate its use as a motive power on railways, as well as in other directions.

P.O. Electrical Apparatus. — On July 2nd, Sir WILFRED SUGDEN asked the Postmaster-General if he would call for details of all electrical and telephonic apparatus and supplies, including cables, needed by his department; and would he institute inquiries in the electrical industries of this country to ensure that the major supplies of this nature were manufactured in Great Britain instead of, as now, being mainly of foreign origin.

LORD WOLMER, Assistant Postmaster-General, said the hon. member was misinformed; more than 99¼ per cent. of the electrical apparatus, including cables, purchased by the Post Office last year was manufactured in this country.

London and Home Counties Electricity Supply Scheme.—A Select Committee appointed by the House of Lords to consider the London and Home Counties Electricity District Order, met under the chairmanship of Lord Donoughmore on July 2nd. The Electricity Commissioners were represented by Sir John Snell and Sir Harry Haward, whilst there were also present representatives of the London County Council, the 10 London companies and the four London companies which have promoted the London Electricity Supply Bills Nos. 1 and 2 respectively, the Conference of Local Authorities owning Electricity Supply Undertakings, and the National Association of Local Government Officers. The terms of reference to the Committee were to consider whether the scheme had been sufficiently dealt with by departmental inquiry, whether an opportunity should be afforded for petitions against the Order, and what alterations or modifications were recommended.

Mr. SEAGER BERRY, representing the 10 London companies, put forward certain objections to the scheme of the Electricity Commissioners in its present form. In the first place, however, he informed the Committee that the 10 companies for whom he appeared, considered that the whole matter had been sufficiently dealt with by the various departmental inquiries, as well as in the discussions that had taken place on the Nos. 1 and 2 Bills. He said that his main point of objection was with regard to the clause in the Draft Order made by the Commissioners, which stated that all authorised undertakers in the district should contribute towards the administrative expenses of the Joint Electricity Authority when formed. Under the Electricity Supply Act of 1922, however, it stated specifically that the expenses of the Joint Electricity Authority were to be contributed by those authorised undertakers represented on the Joint Electricity Authority and therefore he contended that the provision in the Draft Order was *ultra vires*. At the present moment none of the companies in London was represented on the Joint Electricity Authority; he asked that the wording in the Draft Order should be the same as in the Act of 1922. According to the Statute an authorised distributor which was not represented on the Joint Electricity Authority could not be made to contribute towards the expenses of that authority, whereas by the terms of the Order all authorised distributors, whether represented or not, could be compelled to contribute. The position under the scheme would be that the Joint Electricity Authority, when formed, would generate electricity and supply to the local authorities; then the 10 companies which he represented would generate and supply to themselves, and finally there would be the other group of four companies generating and supplying to themselves. Although there was no competition between the three bodies generally, the Joint Electricity Authority could compete in the areas of the companies for large power loads such as docks, railways, &c., and to that extent the contribution of the companies towards the expenses of the Joint Authority would subsidise competition against them. However, the companies did not wish to hamper the Joint Electricity Authority in its inception, and he would make the offer that the companies should make this contribution towards the administrative expenses of the Joint Electricity Authority for the first five years. At the end of that time the Authority would be able to pay its way and as its expenses then should be on account of generation only, there should be no call upon the companies.

Mr. SYDNEY MORSE, for the Group of four companies, supported the amendment asked for by Mr. Berry.

On behalf of the London County Council the amendment was objected to. At the same time the Committee was asked to amend Paragraph 31 of the Order so that all authorised undertakers, whether local authorities or companies, should furnish statistics, &c., to the Joint Electricity Authority. At present under the Order only the local authorities were compelled to furnish those statistics which, it was stated, created the position that whereas the companies would be able to ascertain the position of the local authorities, the local authorities would not have similar information with regard to the companies.

Mr. MORSE said that this question had been before the Commissioners at all their inquiries and it had been agreed that the companies should have financial and administrative independence.

On behalf of the London County Council it was next asked that the date of election of members of the Joint Electricity Authority should be December instead of April, in view of the fact that the borough councils' elections were in November and that new members should come on to the Joint Authority immediately.

The National Association of Local Government Officers raised a point with regard to the compensation of officers and servants for loss of employment under the scheme. It was pointed out that under the Order no officer or servant could claim compensation if he had not been in the employ of the particular authorised undertaker before May 8th, 1919. This it was pointed out applied only to the local authority employés because in the two Bills relating to the companies no such limitation of date was imposed. It was understood that the Commissioners were not averse to making the scheme uniform for both companies and local authorities, but they feared that it would be *ultra vires* for them to do so having regard to a Section of the Act of 1919.

On behalf of the Conference of Local Authorities it was stated that if the Committee made the alteration asked for by Mr. Berry they must ask for permission to be heard against it.

SIR HARRY HAWARD, one of the Electricity Commissioners, said the Commissioners challenged Mr. Berry's interpretation of Section 5 of the Act of 1922 with regard to the contribution to the expenses of the Joint Electricity Authority by authorised undertakers. The intention all through had been that all authorised undertakers should contribute and nobody had contemplated the position that an authorised distributor would refuse to contribute towards the expenses of that Authority. There was no question of the Authority's paying its way, because there must always be administrative expenses so that no limit of time could be set during which authorised distributors could be asked to contribute towards administrative expenses. The Authority had not only to generate but it had to act in an advisory capacity, so that there would always be expenses which could not be put on to the charge for electricity supplied by the Authority to the local authorities. The fact that the Commissioners had to approve the estimates of expenditure each year by the Joint Authority was sufficient check upon extravagance which was suggested by Mr. Berry.

The CHAIRMAN said that the very important question raised by Mr. Berry would have to be carefully considered and a decision would be given later. With regard to the alteration concerning statistics suggested by the London County Council, the Committee did not think that that alteration should be made, neither did the Committee think that the date of election should be altered from April to December.

SIR HARRY HAWARD, dealing with the question of compensation said the Commissioners were fully in sympathy with the suggestion of the N.A.L.G.O., but the only question was whether it would be *ultra vires*.

The Committee then adjourned; its decisions will be announced later.

Transfer of the U.S.A. Bureau of Mines to the Department of Commerce.—President Coolidge on June 4th by executive order transferred the Bureau of Mines from the Department of the Interior to the Department of Commerce. In furtherance of the same purpose the President some months ago transferred the Patent Office, and other bureaux will be similarly treated when the required legislation is obtained under the reorganisation Act. In many respects the two Departments were engaged on work of the same character, and the purpose of the transfer is to avoid duplication and to facilitate relations with the public.—*Science*.

Educational. — ROYAL TECHNICAL COLLEGE, Glasgow.—Department of Engineering. The Session 1925-26 commences on Tuesday, September 22nd. The Calendar, 3s. post free, and prospectus, gratis, can be obtained on application to the Director at the College.

MANCHESTER MUNICIPAL COLLEGE OF TECHNOLOGY.—The prospectus giving particulars of the courses in electrical, mechanical, and sanitary engineering, and in chemical, textile, and photographic technology, can be obtained free on application to the Registrar, College of Technology, Manchester. The new session commences on Thursday, October 8th. (See our advertisement pages to-day.)

Legal.

Theft of Wire.

THE Bristol *Evening Times and Echo* reports that Frederick Farren pleaded guilty at the Bristol Police Court on June 29th to the theft of 750 ft. of electric wire, valued at £2 12s. 6d. Mr. Reed, the owner of the wire, stated that he found the defendant putting the wire in the United Methodist Chapel and discovered that he had contracted with the chapel authorities to do the work for nothing if they would pay £35 for the materials.

The defendant was sentenced to a month's imprisonment with hard labour.

Manager's Claim for Wrongful Dismissal Settled.

IT was announced at the Derby Assizes last week that terms of settlement had been arrived at in the action brought by Mr. Daniel Wise, of Long Eaton, against the Concordia Electric Wire Co. for wrongful dismissal from the post of manager of the company's Sawley works.

Mr. CRAIG HENDERSON, K.C., for the plaintiff, said that the terms included the payment of compensation to his client.

Tucker v. Wandsworth Electric Mfg. Co., Ltd.

MR. JUSTICE TOMLIN, in the Chancery Division on July 3rd, had before him an action by Mr. J. B. Tucker, of Solihull, Birmingham, against the Wandsworth Electric Manufacturing Co., Ltd., of Birmingham for an injunction restraining an alleged infringement of his letters patent for electric switches.

Mr. WHITEHEAD, K.C., for the plaintiff, said the defence was that the patent was invalid and for this purpose the defendants relied on a number of prior specifications and alleged prior users, and they also said that they were not guilty of infringement. Explaining the nature of the action, Counsel said there was a general type of switch known as a "quick make-and-break" switch. Where one was dealing with fairly high voltages it was necessary that on the break there should be an adequate separation between the two parts of the contact, because, if it was not adequate, arcing might result. The plaintiff's specification described the invention in relation to a particular switch of the tumbler type. Reading the claims contained in the specification of the plaintiff's invention, Mr. Whitehead said the first claim was for a switch with quick make-and-break action by virtue of a compression spring pivotally operating on the one hand with a contact arm and on the other with an operating member which was utilised for positively displacing the contact arm in the operations both of making and breaking in the event of the spring failing to act or to act effectively. That claim, he said, had been infringed.

SIR ARTHUR COLEFAX, K.C. (for defendants) said the issue would turn on the words "pivotally co-operating . . . . with an operating member." The question was: Did this exclude the case of an intermediate member or did it include such a member?

The second claim, said Mr. WHITEHEAD, could be infringed by a device which differed only colourably from the device illustrated in the specification. What he said was that the defendants' apparatus, in so far as it differed from plaintiff's by having a slot cut in the contact arm instead of two lugs on it, and by the arrangement of an open compression spring as against one in a closed box, was only colourably different from the plaintiff's switch. It was not necessary for him to go so far as to say that a claim of this sort could be infringed by mechanical equivalents.

Expert evidence was given by Mr. G. E. Folkes as to the plaintiff's patent.

The hearing was adjourned.

Business Notes.

Commercial and Industrial Developments, Business Changes, Trade Opportunities, New Publicity Literature, Liquidations and Failures.

The "Electrical Review" Index.—The Index for the last half-yearly volume of the ELECTRICAL REVIEW (January to June, 1925), will shortly be published. Copies will be forwarded post free to those requiring them for binding or for reference purposes, if they will make application to the Publisher, ELECTRICAL REVIEW, 4, Ludgate Hill, E.C.4.

The E.D.A. Appeal.—Attention was called at a meeting of the Blackburn Town Council on July 2nd to the decision of the Electricity Committee to increase its annual subscription to the British Electrical Development Association to £156. Alderman Higham (chairman of the Electricity Committee) said the Association acted on similar lines to the British Commercial Gas Association. The only difference in Blackburn was that the Electricity Committee paid its Association £100 less than was the case with the Gas Department.

A Manchester Dispute.—A correspondent states that members of the Manchester City Council have been circularised by the local electrical factors concerning certain friction with the Corporation Central Purchase Committee. The complaint is made that all city factors have been omitted from the list of firms whose tenders for electric lamps have been accepted. It is contended that the Committee does not save any intermediate profits, as the local tenders were the same as, or lower in price and discount than, those of the favoured firms. The point of the grievance is that the Corporation should, quality and price being equal, give its own ratepayers an opportunity of making a living.

Radio Corporation Restrained from "Spying."—The *Electrical World* states that the application of the De Forest Radio Company for an injunction restraining the Radio Corporation from using spies in the De Forest plant and soliciting information from the De Forest employés has been sustained by Vice-Chancellor Backes in Newark, N.J. The vice-chancellor modified the existing injunction to the extent of permitting the Radio Corporation to make use of information already obtained as evidence in a pending litigation, but denied the Corporation the right to maintain an organisation of spies in the De Forest plant.

Trade Announcements.—MESSRS. C. HARRISS & Co., electrical power engineers, of Strover Street, Gillingham, Kent, have changed the name of the firm to The Electrical Power Repair Co. The same partners (Messrs. C. Harriss and W. Orrick) continue; the object of the change is to indicate the special nature of the business, which is the repair of armatures, stators, rotors, &c.

The offices of *Combustion* have been removed to Hampden House, 84, Kingsway, London, W.C.2.

Mr. R. FERGUSON BROWN, late of Glasgow, who has resumed business as an electrical engineer and contractor at 3, Ewenfield Road, Ayr, desires to receive catalogues, &c.

Mr. R. H. TURNER, of St. John's Road, Eastwood, has taken over the wireless business of Mr. H. Handley, of 193-195, Infirmary Road, Sheffield.

MR. S. E. HUNT, electrical engineer and contractor, has opened new premises at 8a, Torwood Street, Torquay.

MR. E. MERCER, electrical and radio engineer, has opened new showroom premises at 37, Bridge Street, Castleford, Yorks.

MESSRS. E. HODGKINS & Co., have removed to 64, Stafford Street, Birmingham. Telephone No. "Central 65."

MESSRS. WOOD & CARLING have removed to 161, Wardour Street, London, W.1. New telephone No.: "Regent 4796."

Bankruptcy Proceedings.—F. A. FRASER, 33, Tothill Street, Westminster, S.W.1, electrical engineer.—The first meeting of creditors herein was held on June 26th at the London Bankruptcy Court, and in the absence of any resolution the administration in bankruptcy was left in the hands of the Official Receiver. According to the debtor's statements it appeared that some 30 years ago he obtained employment with a telephone company, eventually becoming engineer. Some 16 years ago a company was formed and he became a director and engineer, and he continued with it until it went into liquidation last year. On January 1st a new company was formed, and the assets, goodwill, lease, &c., of the old undertaking were bought from the Official Receiver. The new company was now carrying on business at the same address. The debtor estimated his liabilities at £3,000, of which the greater portion was due in respect of guarantees. He attributed his present position to the loss of his investments in the old company in which he held two-thirds of the shares, and he possessed no assets whatever.

J. E. LOCKING, 14, Fish Street, Kingston-upon-Hull, dealer in cycles and wireless goods.—The public examination of this debtor was held on June 29th at the Guildhall, Hull. The statement of affairs showed liabilities of £291, against assets of £46. Debtor was formerly a dock labourer, and commenced business as a cycle dealer in 1922. Later he opened a workshop and stocked radio apparatus, purchasing stock to the value of £250. When he gave up the business his stock only realised £18, although the debtor considered it was worth £150. The examination was closed.

J. R. PATTISON, 15, Goldsmith Street, Nottingham, electrical supplies factor.—The public examination of this debtor was held on July 2nd at the County Court House, Nottingham. The statement of affairs showed liabilities of £2,266, against assets of £280, or a deficiency of £1,986. Debtor stated that he commenced business as an electrician in July, 1920, with £500 lent by his father-in-law. He was in financial difficulties by the end of 1923, and his father-in-law advanced him further sums from time to time. The examination was closed.

G. HILL, G. NOBLE and E. COWLEY (G. Hill & Co.), electrical engineers, 20, Chantry Lane, Gt. Grimsby.—Supplemental dividend of 2 13/16d. in the £, payable at the Official Receiver's office St. Mary's Chambers, Great Grimsby.

H. A. BIRLESON (Birleson & Co.), electrical engineer, Clarence Buildings, Back Fazackerley Street, Chorley.—First and final dividend of 2s. 7½d. in the £, payable at the Official Receiver's office, 11, Winckley Square, Preston.

F. J. NORTH, electrical engineer, 13a, Midland Road Wellingborough.—Receiving order made June 25th, on debtor's own petition. First meeting, July 8th, at the Official Receiver's office, The Parade, Northampton; public examination, July 10th, at the County Hall, Northampton.

S. O. COWPER-COLES, galvanising plant manufacturer, Rossall House, Thames Street, Sunbury-on-Thames.—Application for discharge to be heard on July 31st, at the Court House, Kingston, Surrey.

H. FILDES, electrical engineers' superintendent, 108, Monton Road, Eccles.—Receiving order made June 25th, on creditors' petition.

W. R. GRIGSBY (Wenham Lighting Corporation), electrical factor, 184, Gray's Inn Road, W.C.—Trustee, Mr. E. H. Hawkins, 4, Charterhouse Square, E.C., appointed June 25th.

B. N. HALSON, electrician, 29, Mayfield Road, Northfleet, Kent.—Trustee, Mr. A. H. Ward, Official Receiver, 280a, High Street, Rochester, released May 20th.

F. W. CASELEY (The Radiograph Co.), wireless engineer, 5, Hepworth Arcade Kingston-upon-Hull.—Receiving order made June 30th on debtor's own petition.

D. BOULD, motor and electrical engineer, Burn Croft, Birchencliffe, Huddersfield.—Trustee, Mr. W. Durrance, 12, Duke Street, Bradford, released June 19th.

Private Arrangements. — W. R. THORNTON & SON, LTD., electricians, Barrow-in-Furness.—The creditors interested herein were called together on June 29th, when Mr. Houston, representing several trade creditors, was elected to the chair. A statement of affairs as at May 30th last showed liabilities of £9,652, of which £7,214 was due to unsecured creditors, £2,000 was in respect of debentures, £75 secretary's remuneration, £62 Inland Revenue, and £300 contingent liabilities. The assets were valued at £2,667, from which preferential claims of £400 had to be deducted, leaving net assets of £2,267, or a deficiency of £7,385. Mr. W. H. Vale, who had been appointed receiver and manager of the company by the debenture holders, stated that although the ledger showed book debts of £2,550, these had been set down at £1,121. During the last two years, the company had lost £6,000. The chairman said that after the debentures had been deducted there would be nothing available for the unsecured creditors.

The contingent liabilities were stated to be in respect of a claim which had been received for £298 for commission on sales. It was not known whether the claim was good or not.

The company was formed on September 29th, 1916, with a nominal capital of £5,000, of which £4,301 was issued and paid up. The consideration for the purchase of the assets was fixed at £4,300. The company originally carried out contracting work but during the war discontinued contracting, and became a wholesale house. Branches were opened in Reading and Bradford, but these had not paid, and the Reading branch had been closed. Since January 1st, 1925, four bad debts at the Bradford branch had involved a loss of £1,000, and it was consequently decided to close that branch. The business was founded over 64 years ago.

Mr. THORNTON, one of the debenture holders, said that rather than see the business go out of existence, he would take it over, continue it himself, and pay the creditors 2s. 6d. in the £.

The meeting was of opinion that some further investigation should be made regarding the valuation of the assets, and eventually it was decided to appoint a committee consisting of Messrs. W. B. Campbell (W. T. Henley's Telegraph Works Co., Ltd.), G. T. Etches (Edison Swan Electric Co., Ltd.), and Arthur T. Eaves, C.A., representing the General Electric Co., Ltd. The committee, it was intimated, would issue a report to all the creditors after the investigations had been completed, advising whether the offer of 2s. 6d. in the £ should be accepted or not.

H. & T. EDWARDS, electricians, trading as George Miles, 12, Waterloo Road, Smethwick.—A meeting of the creditors of the above was held recently, when a statement of affairs was presented, which had been prepared by Messrs. Poppleton and Appleby, Birmingham. The liabilities were set down at £427, of which £414 was due to unsecured creditors and £13 to the bank. The assets were estimated to realise £197, less £22 for preferential claims, leaving net assets of £175, or a deficiency of £253. It was reported that the debtors took over the business from their mother in April, 1923 and latterly the turnover had declined. A writ was recently issued against them and they consulted their solicitors, who advised the calling together of the creditors. The creditors decided to accept a composition of 5s. in the £, payable in cash within ten days.

Company Liquidations.—HENRY R. LEVESON & CO., LTD., electrical engineers and contractors, 55, Park Lane, Leeds.—A meeting of creditors of the above was held on July 3rd at Leeds. Mr. J. P. Wardale, the liquidator in the voluntary liquidation of the company, submitted a statement of affairs which showed ranking liabilities of £1,788. The assets were estimated to realise £641, from which had to be deducted £28 for preferential claims, leaving net assets of £613 12s. 11d., or a deficiency of £1,175, so far as the unsecured creditors were concerned. The company was registered on March 19th, 1924, with a nominal capital of £2,500 of which £1,500 had been issued. It took over an existing business, and the vendors were allotted £1,000 in fully-paid shares. There were only three shareholders, two being the vendors to the company. The third shareholder introduced £400 in cash and stock to the value of £100 in payment for the 500 shares transferred to him. During the 13 months to April of the present year the sales totalled £5,012, with a loss of £736. The deficiency was accounted for by the loss on trading and depreciation of stock. A resolution was passed in favour of an application being made to the Court for the appointment of Mr. C. H. Baker, Leeds, as the liquidator of the company, whilst a committee was also appointed, consisting of Mr. F. Crosland and the representatives of the Metropolitan-Vickers Electrical Co., Ltd., and Messrs. Dawson & Co., Ltd.

LIVERPOOL ELECTRICAL ENGINEERING (1923), LTD.—Winding up voluntarily. Liquidator, Mr. C. Hodgson, 70, Central Buildings, 41, North John Street, Liverpool. Meeting of creditors, July 13th, at 70, Central Buildings. Particulars of claims to the liquidator by August 31st.

WEAVERHAM ELECTRICITY SUPPLY CO., LTD.—Winding up voluntarily. Liquidator, Mr. H. L. Dale, 4, Darwin Street, Northwich. Meeting of creditors at 20, Winnington Street, Northwich, on July 16th. Particulars of claims to the liquidator by August 4th.

F. S. PETROL ELECTRIC OMNIBUS CO., LTD.—A meeting of members is called for August 5th at 119, Moorgate, E.C., to hear an account of the winding up from the liquidator, Mr. S. H. Clench.

ELECTROLITE, LTD.—First meeting of creditors and contributories, July 15th, at 29, Russell Square, W.C.

TELE-DIS SERVICES (FOUNDERS' COMPANY), LTD.—First meetings of creditors and contributories were called for July 9th at Carey Street, W.C.

ELECTRIC DISTRIBUTING CO., LTD.—Winding up voluntarily. Liquidator, Mr. H. S. Jones, 3, York Street, Manchester.—A meeting of creditors was called for July 3rd.

AIRCO AERIALS, LTD.—A meeting of members is called for August 5th at the offices of Messrs. A. J. Hill, Vellacourt & Co., 2, Broad Street Place, E.C., to hear an account of the winding up from the liquidator, Mr. C. W. Weston.

Dissolutions of Partnership.—HUTTON & QUIRK, electrical engineers, 120, Brook Street, Dundee.—Messrs. M. Hutton and T. Quirk have dissolved partnership. Mr. Hutton will attend to debts and continue the business on his own behalf at the same address.

PARKER & FRIZZELL, motor and electrical engineers, The Garage, Grosvenor Road, Richmond, Surrey.—Mr. C. Parker and Mr. L. T. Frizzell have dissolved partnership. Mr. Frizzell will continue the business.

Meeting of Creditors.—ASTRO ELECTRIC, LTD.—A meeting of creditors is to be held at the offices, Carlton House, Lower Regent Street, London, S.W., on July 14th, when Mr. R. Rook Jones, the receiver and manager, will submit his report on the present position of the company.

Catalogues and Lists.—THE JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, S.W.1.—A blotter bearing a calendar for July and an illustration of an electric iron.

Also three priced and illustrated pamphlets dealing respectively with the "Jackson" electric wash boiler; electric hot cupboards and carving tables; and laundry, &c., irons.

SIEMENS & ENGLISH ELECTRIC LAMP CO., LTD., 38-39, Upper Thames Street, E.C.4.—July price sheet of electrical materials, appliances and accessories.

ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI, 56, Victoria Street, S.W.1.—July stock list of motors and dynamos.

THE MAGNA WIRE & CABLE CO., LTD., 137, Victoria Street, S.W.1.—List C151, a net trade price list of v.i.r. and lead-covered cables; also an advertising blotter.

MESSRS. HERBERT MORRIS, LTD., Loughborough.—A price list of electric hoist-blocks. Illustrated.

TOK SWITCHES, LTD., Granville House, Arundel Street, W.C.2.—A calendar-blotter advertising the "Aristocrat" interlooking switch plug.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—Publication F3707, containing an illustrated description of the "Wembley" street-lighting lantern with views of installations.

SULZER BROS., 31, Bedford Square, W.C.1.—A pamphlet illustrating an installation of the firm's Diesel-engine generating plant.

MESSRS. FERRANTI, LTD., Hollinwood, Lancs.—A leaflet illustrating a 30,000-kVA bank of Ferranti 11 000/120,000-V transformers.

MESSRS. L. MCMICHAEL, LTD., Hastings House, Norfolk Street, Strand, W.C.2.—An illustrated folder describing the company's plug-in transformers, condensers, &c., for h.f. amplification.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., East Pittsburgh, Pa., U.S.A.—Four illustrated pamphlets dealing respectively with motors for mine locomotives, oil circuit-breakers, anti-vibration lampholders, and baking ovens.

THE REGENT TRADING CO., 2, Woodlands Road, Harrow.—A priced and illustrated pamphlet advertising the "Regent" mica undercutter and glass brush.

CRYSELCO, LTD., Kempston Works, Bedford.—A price list of valves of various British makes.

HIGGS MOTORS, Witton, Birmingham.—July stock list of a.c. and d.c. motors.

THE NORWEST ELECTRICAL MANUFACTURING CO., LTD., Motherwell, N.B.—A card bearing illustrations of "Norite" products.

NOBEL INDUSTRIES, LTD., Nobel House, S.W.1.—An illustrated brochure describing the company's exhibit at the British Empire Exhibition.

MESSRS. MAY & PADMORE, Tyseley, Birmingham.—A priced and illustrated folder advertising "Maymore" electric soldering irons, including one for radio work.

THE BRITISH THOMSON-HOUSTON CO., LTD., Mazda House, Newman Street, Oxford Street, W.1.—A brochure describing the company's new showrooms &c., at the above address.

MESSRS. J. STONE & CO., LTD., Deptford, S.E.14.—An illustrated catalogue of "H-R" gears for various applications. Also a folder dealing with the same subject.

MESSRS. CROSSLEY BROS., LTD., Openshaw, Manchester.—Publication No. 2,435, containing a report of a test carried out on "Crossley" heavy-oil engines at a pumping station. Also Publication No. 2,436, illustrating and describing the "Crossley-Premier" multi-cylinder heavy-oil engines.

Book Notices.—"History of the Telephone and Telegraph in Uruguay, 1886-1925," is the title of a brochure by Mr. Victor M. Berthold, of the American Telephone and Telegraph Company. This little Republic had a telegraph service for 21 years before the Government started a national system, in 1887; but in 1892 the Government took over nearly all the telegraph systems then in operation, and in 1894 decided to inaugurate a telephone service. The author minutely chronicles the rather stormy course of events leading up to these results, after which he devotes some 50 pages to the history of the various telephone concessions, of which the chief holder is the Montevideo Telephone Company. The conditions under which the service was carried on were extraordinary, an excessive demand for increased wages on the part of the employés in 1922 being supported by the Administrative Council of Montevideo and the Government, although the latter was then negotiating for the purchase of the undertaking. At the beginning of this year the question of nationalising the service was still unsettled.

"Commercial Credit Risks—Export Credits and Credit Insurance," by A. H. Swain. Pp. 143. London: Sir Isaac Pitman & Sons. Price 5s. net.

The author of this treatise, upon a subject which is of the first importance in the light of the present unsettled condition of the world, is the chairman of the Leicester Electricity Committee and a member of the East Midlands Electricity Advisory Board. The opening chapter of the work deals with the present position of credit insurance in the United Kingdom, and extended consideration is given to the Export Credits scheme of the Department of Overseas Trade. This is followed by a brief study of conditions in the United States in this respect. In the next two chapters the attitudes of the insurance companies and the banks are examined. The other chapters deal with the Government and the "catastrophe" risk; status information; a historical note on the Fuggers of Augsburg and their financial problems (similar to present-day matters in many respects); financial facilities; and a suggested commercial clearing house on a mutual basis in which the conclusions drawn from the preceding chapters are "crystallised" in a definite way. There are two appendixes, one reproducing a *questionnaire*, circulated by the D.O.T., relating to insurance against bad debts in export trade; the other a statement by Mr. Arthur Kitson on the American financial crisis of 1893.

"Mechanical Appliances, Mechanical Movements, and Novelties of Construction." By Gardner D. Hiscox, M.E. Pp. 412; fully illustrated. London: Constable & Co., Ltd. Price 21s. net.—This volume contains short illustrated descriptions of 998 engineering devices chiefly mechanical, which have either been put on the market or are merely suggestive ideas.

The issue of the *Mechanical World* for July 3rd is the first of a new series of that journal enlarged by 25 per cent. and containing a number of new features, without sacrificing existing ones, and without any increase in subscription rates. The journal is an old friend, and we are glad to see it progressing and extending its usefulness to the engineering industry.

"The *Journal* and Record of Transactions of the Junior Institution of Engineers." Vol. XXXV. Part X. July, 1925. London: Percival Marshall & Co.

"The *Journal* of the South African Institution of Engineers." Vol. XXIII, No. 11. June, 1925. Price 2s. net.

Sofia to Compensate Belgian Company.—The International Tribunal has just given its award in the action brought by the Société d'Electricité de Sofia, a Belgian undertaking, against the municipal authorities of Sofia in respect of the seizing of its central station and distribution system in 1914. The award is in favour of the company, which is not only to have its plant handed over immediately, but the concession is to be extended for 20 years without further payment. In addition, the Municipality is ordered to pay the company an indemnity of 9 million Belgian francs.

Social Events.—The sixth annual sports of the General Electric Co., Ltd., were held on Saturday, June 13th, on the main playing field at Witton, which, together with the Magnet Club building, has been provided by the company for the benefit of its employés. The "Harold Hirst" Cup for the 100 yards flat race was again won by A. Bird, of the Witton Works.

G.E.C. GALA AND ANNUAL SPORTS.—In celebration of the official opening of its new sports ground at Wembley, the General Electric Co., Ltd., held a successful gala day at the ground on Saturday last. Many sports events took place, the most outstanding being probably a cricket match between teams representing the head office and other London establishments of the company, the result being a draw. During the afternoon the chairman, Sir Hugo Hirst, Bart., declared the ground open. In his address he referred to the recent honour which had been conferred on him, and said that it was not due to his work alone, but also to that of the G.E.C. staff which had supported him. He was a sportsman, and wished to see sports fame attained in the company; he would be willing to defray the expenses of any member of the firm who could get into the Olympian games. Lady Hirst subsequently presented the prizes to the winners of the events of the day. The new ground comprises about 17 acres, including five football and four cricket pitches, 12 tennis courts, and a pavilion.

The Hackbridge Transformer Sports Club recently held its annual sports meeting at the new sports field adjoining the company's works at Hersham. About 2,000 employés and friends attended. The prizes were distributed by Mrs. J. F. Cleeves (wife of a director) at the close of the meeting, after which the large assembly participated in dancing on the lawn and in the amusements of a first-class fair.

The annual "outing" of the employés of the Merthyr Electric Traction & Lighting Co., Ltd., took place on June 25th, the party proceeding to Weston and Cheddar by charabanc and boat. Mr. F. J. Cursons (secretary) presided at dinner at Weston, and tea was taken at Cheddar. The arrangements were very successfully carried out by Mr. E. J. Rowlands.

On June 27th the employés of Messrs. Gent & Co., Ltd., held their annual "outing." The party travelled from Leicester to Matlock Baths and from the latter centre explored the Peak District in groups. The co-operation of the directors added to the day's enjoyment.

"Amplion" Loud-speakers Abroad.—At a time when complaints of German penetration into the British radio market are heard on all sides, it is of interest and satisfaction to see the process reversed. The accompanying picture is a view of a stand at a recent Frankfort fair, on which

"Amplion" Loud-Speakers at Frankfort, Germany.

"Amplion" loud-speakers (Messrs. Alfred Graham & Co.) were prominently displayed by the Cie. Continentale Amplion. Messrs. Graham have also sent us two other photographs, one showing an exhibit of "Amplions" at Copenhagen and the other a similar display at Toronto.

Annual Holidays.—The works of the Metropolitan-Vickers Electrical Co., Ltd., will be closed for the annual holidays from the evening of Friday, July 24th, until the morning of Tuesday, August 4th.

Lead.—Reporting on July 4th, Messrs. James Forster and Co. stated:—"Buying by cable makers on a moderate scale was chiefly responsible for yesterday's advance, accentuated by some 'bear' covering of July lead. This small amount of buying was sufficient in the present firm state of the market to send the price up 10s. a ton. . . . A steady consumption is going on in this country of from 18-20,000 tons a month, and whereas a month or two ago there was plenty of lead to meet it, there are signs now, owing to short arrivals in June, of lead for prompt delivery becoming more difficult to obtain."

British Trade-mark Applications.—The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 1st:—

Exaphone. No. 458,424. Class 8. Instruments and apparatus used in telephony.—The International Exaphone Co., Ltd., Derby.

Spartanite. No. 458,714. All goods in class 8.—Fuller's United Electrical Works, Ltd.

Meron. No. 457,981; Neron. No. 457,991; and Maron. No. 457,994. Class 8. Instruments and apparatus, and parts thereof, for use in radio-telephony and telegraphy. No. 457,982. Class 13. Electric lamps (ordinary), lamp-holders, electrodes, &c.—Osram Gesellschaft, 11-14, Ehrenbergerstrasse, Berlin, O.17, Germany. (British representatives: Cruikshank & Fairweather, 65-66, Chancery Lane, W.C.2.)

Matched Tone Trade Mark (lettering and design). No. 455,643. Class 8. Headphones and parts thereof for use in radio-telephony.—Brandes, Ltd., 296, Regent Street, W.1.

Receptite. No. 456,917. Class 8. Detector crystals for use in radio-telephony.—W. T. Cocking and D. E. Salari, trading in co-partnership, 78 Estcourt Road, South Norwood, S.E.25.

The Condition of French Industry.—The Paris correspondent of the *Daily Mail* recently said:—"In nearly every industry French factories are working overtime and are yet unable to meet all their contracts, not only for the home markets but also for abroad. Big metallurgical and electrical firms have large orders for foreign markets, notably for China and other parts of the Far East."

Japanese Electrical Imports.—The destruction of the Government archives in Tokio by the earthquake of September, 1923, involved the loss of a mass of statistics, including those relating to foreign trade. This accounts for the non-appearance of any detailed figures since the publication of those for 1921. The total figures of two important items in the import list for the years 1922 and 1923 are as follows:—Electrical machinery and apparatus, 12,824,555 yen and 11,359,210 yen, respectively; and insulated electric wire, 485,107 yen and 1,885,053 yen, respectively.

Registration of Trade Marks in China.—The British Chamber of Commerce announces that the period for registering marks under Clause 4 of the Trade Mark Law has been extended to December 31st, 1925.—*Reuter* (Shanghai).

"Relay" Exchanges for Switzerland.—Last year the Director-General of Telephones, Berne, Switzerland, installed as an experiment a small "Relay" automatic telephone exchange in one of the rural areas of Switzerland. The Swiss telephone authorities have now ordered a further twenty "Relay" exchanges for installation in various places in Switzerland.

New Zealand's Electrical Imports.—The *Board of Trade Journal*, in a review of New Zealand's external trade during the first quarter of the current year, states that Great Britain increased her share of the trade in electrical machinery and appliances, having supplied 70 per cent. of the total imports, which were valued at £632 000.

Australian Tariff Applications.—In May last Amalgamated Wireless (Australasia), Ltd., applied to the Australian Tariff Board for the imposition of an increased scale of duty upon imported radio apparatus and for the free admission of the raw materials of the industry. Considerable opposition was encountered by these proposals, a representative of the British General Electric Co. stating that the admission free of duty of headphones (which it was suggested should be classed as "raw material") would result in a heavy loss to those firms who held large stocks of the appliances, as they would be drastically undersold by cheap imported apparatus which had not paid duty.

Scanlon's Electric Co., a firm of switchgear manufacturers, asked for increased duties on knife switches, low- and medium-pressure fuses, and motor-starting equipment. It was stated that a number of English concerns were landing this gear at prices which gave local manufacturers "considerable trouble."

Another firm, making telephone apparatus, asked for increased protection in respect of this class of goods. A representative of the Ericsson Telephone Co., in opposing the application, said that Australian manufacturers could not produce one-tenth of the Commonwealth's telephone requirements.

The Tariff Board's decisions in these cases are not yet to hand.

Alleged "Price Ring" in Australia.—At a meeting of the Sydney City Council in May, the question of concerted tendering was again raised. It was stated that tenders were invited for the supply of rubber-insulated cables; nine offers were received and they all bore the same price. The Council decided to eliminate two companies from the list as it was alleged that they were concerned in the recent "scandal" of adding an extra amount to a tender for distribution to the unsuccessful tenderers. It was left to the general manager (Mr. Forbes Mackay) to decide which firm should receive the contract.

Unemployment.—An increase of 19,330 occurred in the number of unemployed persons during the week ended June 22nd, the total at that date being 1,299,700. This represents an increase of 285,918 in the past twelve months.

For Sale.—Woolwich Corporation Electricity Department has for disposal one 1,500-kW Willans-Siemens turbo-alternator plant. (See our advertisement pages to-day.)

The Chinese Disorders.—The Shanghai correspondent of the *Daily Telegraph* reported on July 5th that the Municipal Electricity Department had decided to cut off the bulk of the power supplies at noon on July 6th, while maintaining lighting. "This action will affect chiefly the Chinese mills, most foreign concerns being idle. Essential undertakings will be excepted, but the action will not only affect the settlement mills, but mills outside, as settlement power plant at the riverside, recently completed at a cost of 30,000,000 taels, and selling over 300,000,000 kWh annually, supplies many Chinese outside the settlement through a native electricity company. The decision will mean total industrial cessation inside the settlement and restriction of production outside, but the department announces that this is inevitable owing to inability to maintain output since the strike of Chinese. The general opinion is that this step will shorten the duration of the strike."

Street Lighting in Tottenham Court Road.—The old series arc-lighting system in Tottenham Court Road, London, has been replaced by 1,000-watt Siemens gasfilled lamps arranged in series between the outers of a three-wire d.c. distribution system, the change-over involving very little expense. As a result, the whole of the thoroughfare is brilliantly illuminated, and the buildings stand out in bold relief.

The New Chester Showrooms. — The new showrooms acquired by the Chester Electricity Department at a cost of £10 000 were recently inaugurated by the Mayor. The premises are in one of the busiest shopping thoroughfares and have an imposing appearance, the entrance being flanked by two attractive show windows in which washing machines and other domestic appliances have been arranged. In the main shop is a series of recessed tiled hearths in which electric fires of various patterns are fitted. Another notable feature is a varied array of lighting fittings. A commodious oak counter provides space for the display of numerous small appliances, and full use is made of showcases in all odd corners and niches. On the same floor a suite of rooms has been arranged with the appropriate electrical equipment; this comprises a dining-room, a bedroom, and a bathroom. On the top floor are the Department's offices. Every appliance is to be provided with a card showing its consumption, initial cost and running cost. Particular attention is given to electric cooking, the Corporation having instituted very favourable rental and hire-purchase systems for cookers. Prior to the opening ceremony the efficacy of electric cooking was practically demonstrated by the provision of an electrically-cooked dinner in which members of the Electricity Committee participated at the invitation of their chairman. The reconstruction of the premises and their layout were carried out under the supervision of Mr. W. A. Gillott, A.M.I.E.E.

New "Exide" Depôt.—On July 1st, the Chloride Electrical Storage Co., Ltd., opened a new depôt at Tureen Street, Gallowgate, Glasgow, where every facility for the sale, charging and repair of accumulator batteries is available. The new premises will be under the control of Mr. McDonald Sinclair, A.M.I.E.E., the company's general representative for Scotland.

The Reduction of Railway Expenses.—The railway companies of Great Britain have made proposals to the trade unions in which their employés are organised which, it is estimated, will result in a reduction of £6,000 000 in their annual expenditure. Briefly, it is suggested that the whole of the officials, staff and employés, shall consent to a "cut" of 5 per cent. in their fees, salaries or wages, for a period of a year, at the end of which the position would be reviewed. The trade unions have raised the question of the application of the scheme to stockholders, but the companies have so far not replied to this. The companies promise that if the unions agree to the "cut" they will restore the railway workshops, which are at present on short time, to the full working week.

Rumanian Export Taxes.—According to *La Dépêche Commerciale*, the Rumanian Government is imposing an export tax on a number of classes of goods. These include electric motors, which are subject to a levy of 5 lei per kg., and "electric burners" ("*becs électriques*"), 5 lei per 100 kg.

An American View of European Electrical Conditions.—The *Electrical World* quotes the views of Mr. H. E. Irish, purchase engineer of the Western Electric Co., who recently returned from a six months' business trip abroad. Mr. Irish says that European business conditions seem to be generally better. "Credit and money are to some extent more stable; unemployment, although serious in England, has been greatly reduced in Germany, and is not an important factor in France. Political conditions, upon which almost everything depends, seem gradually to be becoming somewhat more settled." The development of power and lighting companies is going ahead rapidly in many countries, but the lack of standardisation is a serious bar to manufacturers seeking to enter this field. There is always a certain demand for American electrical equipment, but in the main Mr. Irish believes that the American contribution will be along the line of leadership in new technical developments rather than the export of any great quantity of supplies.

"This is in part because electrical development is influenced to so large an extent by political conditions," said Mr. Irish. "The telephone, radio, and, in some instances, power, are in general controlled by the governments. The use of electricity was stimulated by the war, and is probably growing faster than it otherwise would have grown, but most of the manufacturing will probably continue to be done in local national factories. The employment situation has added force to this policy, which is a deliberate one. Home industry is generally supported even when better supplies could be obtained from another country at lower prices. This preference for home products will probably continue. National feeling at the present time is particularly high, and the opportunities for exporting electrical supplies to Europe may be less now than at some periods in the future."

Radio is reported as being apparently popular, and Mr. Irish received the impression that a much wider popularity is at hand. This, however, is thought to be limited by inherent characteristics of European nations, which will probably prevent a sweep of radio enthusiasm comparable to that in the United States.

New Netherlands Tariff.—The *Board of Trade Journal* of July 2nd contained a translation of Groups V and IX of the schedule of goods which will be dutiable under the Netherlands Tariff Law of 1924. The first group comprises electro-technical articles, including all kinds of switch- and fuse-gear, measuring instruments, rectifiers (except rotary and mercury-vapour types), static transformers, &c. Group IX includes telegraph, mining, and signalling apparatus, &c. All goods in these classes are subject to a duty of 5 per cent. *ad valorem*.

The Persian Electrical Market.—According to the *British Export Gazette*, importers into Persia are experiencing a growing demand for electric fans, irons, and vacuum cleaners, and other electrical appliances. This applies mainly to the cities where current is available, but, in addition, the more prosperous among the landowners are beginning to install self-contained lighting and power outfits for their homes, gardens, and estates, and the sale of motors, both for alternating and direct current, is likely to increase steadily. The vogue was introduced during the war by the British military forces stationed along the Persian Gulf, and by inference the bulk of the supplies should be drawn from the United Kingdom.

The F.B.I. and the Pensions Bill. — The Federation of British Industries has addressed a protest to the Government against the extension of the Insurance Acts to provide for widows', orphans', and old age pensions. The Federation states that the burden of social services already bears hardly on industry and the additions now proposed will be highly detrimental; indeed, in the cases of trades which are exposed to the full force of foreign competition they may well involve actual disaster.

The State of German Industry.—Activity on the German metal market, says the *Deutsche Bergwerks Zeitung*, has again dwindled after a short period of liveliness. The improvement in the orders received in the machine building industry is worthy of mention. The cable works and the electrotechnical industry are still well employed; the Post Office in particular seems to have been giving larger orders of late. The brass works have also plenty of work in hand, but considerable quantities of semi-finished goods are being offered in the trade at low prices. The situation in the labour market has hardly changed.—*Reuter's Trade Service* (Essen).

New French Company.—A new company has recently been formed with the title La Société Hydro-Electrique de l'Afrique du Nord, to establish an electric power station to utilise the water power of the River Ould-el-Berd in Algeria.

New Swiss Company.—Under the auspices of the Bernischen Kraftwerke Gesellschaft, a new company has been formed in Berne under the title of the Oberhasli Kraftwerke Gesellschaft, to establish and work the large new hydro-electric station at Oberhasli.

Irish Free State Electrical Imports.—As a measure of economy, the Irish Free State Government, at the commencement of the present year, ceased to issue its usual monthly detailed import and export returns, only monthly summaries being now issued. The latest of these available is for the three months ended with March last, during which period the imports of electrical goods—a term which apparently does not include generators, motors, and other electrical machinery—attained a value of only £73,568, as compared with £100,896 in the corresponding quarter of 1924.

Lighting and Power Notes.

Australia. — TASMANIA.—*Launceston.*—We have received from Mr. R. J. Strike, city electrical engineer, a copy of his report, together with the statement of accounts of the electricity undertaking for the year ended June 30th, 1924. The total revenue was £59,517, and the working expenses were £44,426, leaving a gross profit of £15,091. The figures for the previous year were: Income, £56,125; working expenses, £32,753; gross profit £23,373. After meeting capital charges there was a deficit of £557, as compared with a surplus of £8,061 in the preceding year. The electrical energy sold amounted to 4,836,076 kWh, an increase of 629,055 kWh. The Council decided to change over the voltage of supply to consumers from 110/190 to 240/415 V, and a portion of the South Launceston area was completed during the year.

Birmingham.—YEAR'S WORKING.—The statement of accounts of the Corporation electricity undertaking (engineer, Mr. R. A. Chattock) for the year ended March 31st last, records a total revenue of £1,182,622, as compared with £1,110,028 in 1923-24. Working expenses totalled £736,855, as against £668,197, leaving a gross profit of £445,767 (£441,831), to which was added bank interest of £2,884, and the sum of £31,000 brought from the reserve fund, making a total of £479,651. This was distributed as follows:—Interest, £180,465; redemption of debt, £176,621; payment to the Tramways Department in respect of feeders, cables, &c., £1,368; payment to the Tame and Rea District Drainage Board in respect of railway siding, £449; borough rate, £31,000; surplus carried to renewals and special expenditure account, £89,370. The surplus on the previous year's working was £102 224. The amount spent on capital account during the year was £841,567, and was made up as follows:—Land, £1,028; buildings, £105,312; machinery and plant, £446,186; mains, £289,042. The sales of electrical energy amounted to 193,370,748 kWh, an increase of 22,218,158 kWh, and the average price per kWh obtained fell from 1.556d. to 1.468d. The motor connections increased from 186 927 to 206,160 h.p., and the lamp connections in 60-watt lamps from 556,068 to 659,666.

Chester.—LOAN SANCTIONED.—The Electricity Committee has received sanction to the borrowing of £10,000 for mains for supplying electricity to the parishes of Tarvin, Barrow and Aldford.

Continental.—BELGIUM.—A new 4,800-6,000-kW turbo-alternator set is being installed at the power station connected with the collieries of the Société des Charbonnages Winterslag. An electric winding engine is also in course of erection.

GREECE.—Owing to the increasing demand for electricity in the town of Salonica, the Société des Tramways et Eclairage Electrique de Salonique is now establishing a new central power station.

Crediton.—ELECTRICITY SUPPLY.—The question of an electricity supply for the district was considered by the Urban District Council at a recent meeting, when it was stated that the Electricity Commissioners had refused to sanction the erection of a generating station at Crediton. The clerk stated that the commissioners had communicated with the Exeter City Council to the effect that the terms offered for supplying Crediton with electricity in bulk were excessive and that in consequence Exeter had submitted revised terms as follows:—£250 for the first year's supply, £300 for the second year, £350 for the third year, £400 for the fourth year, and £500 for each succeeding year. The Council decided to consider the matter further in committee.

Croydon.—YEAR'S WORKING.—The report of the borough electrical engineer (Mr. A. C. Cramb) on the working of the electricity undertaking for the year ended March 31st last, shows a total revenue of £204,757, as compared with £173,150 in the preceding year. Working expenses, including special expenditure charged to revenue account, amounted to £138,898 as against £124,841, leaving a gross surplus of £65,859 (£48,309). After providing for capital and other charges there was a net surplus of £9,194, as compared with £2,446 in 1923-24; this was transferred to reserve. The capital expenditure during the year amounted to £152,074, the main items being £67,035 for machinery and plant, and £42,538 for mains. The sales of electrical energy increased from 14,947,610 to 18,724,318 kWh and the average price per kWh obtained fell from 2.728d. to 2.498d. The maximum supply demanded rose from 8,600 to 9,200 kW. The extensions to the works which it was hoped to have completed last autumn were held up by a delay in the completion of the reconstruction of the buildings, but it is anticipated that the work will be completed and the new 10,000-kW turbo-alternator installed in time for next winter's load.

Dalkeith.—ELECTRICITY SCHEME.—It is proposed that the existing main of the Lothians Power Company should be extended to the Dalkeith generating station, where a metering and control panel, a transformer, and converting plant should be installed. Mr. Dixon, Dumbarton, for the Electric Supply Corporation, is to furnish the Town Council's engineer with the details and probable cost of the proposed scheme.

Ilford.—LOANS.—The Urban District Council has applied for sanction to loans of £20,000 for mains and services, and £2,000 for apparatus to be let out on hire.

Kingston-on-Thames.—ELECTRICITY SUPPLY.—Application has been made by the Town Council for sanction to a loan of £4,000 for extending the mains in the Cambridge Road area. The Council has sealed an agreement with the Twickenham and Teddington Electricity Supply Co., Ltd., for a supply of electricity in bulk to the company for distribution to consumers at Ham.

Keighley.—NEW FEEDER CABLES.—The Electricity Committee has recommended to the Town Council that the existing feeder cables in connection with the railless-car system be replaced by new and larger cables and that new control gear be provided at the generating station at a total estimated cost of £4,000.

Liskeard.—ELECTRICITY SUPPLY.—The proprietors of the Liskeard (Cornwall) Gas Co. have confirmed a resolution to convert the old private company into a limited liability company, with a view to developing the supply of electricity. It was stated that it was hoped the installation of plant would be sufficiently advanced to enable current to be supplied during the coming autumn.

Liverpool.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer Mr. H. Dickinson) for the year ended March 31st last, show a total revenue of £1,037,673, as compared with £966,338 in 1923-24. Working expenses amounted to £591,269, as against £528,937, leaving a gross profit of £446,404 (£437,401), which was distributed as follows: Interest, £153,524; repayment of loans, £597; contribution to Bootle Corporation stock redemption fund, £1,277; sinking fund contributions, £130,579 (£2,851 contributed by the Housing Committee); renewal fund, £43,278; city rate, £120,000. During the year £535,909 was spent on capital account, the chief items being £184,107 for mains, £154,308 for machinery, £113,148 for buildings, and £84,245 for accumulators.

London.—ST. MARYLEBONE.—The report on the working of the Borough Council's electricity undertaking (engineer, Mr. C. H. Smyth) for the year ended March 31st last, records a total income of £435,628, as compared with £406,226 in 1923-24. Working expenses totalled £220,999, as against £220,548, leaving a gross surplus of £214,630 (£185,678), to which was added interest on bank balances, &c., making a total of £215,850. After deducting capital charges there was a net surplus of

£49,614, as compared with £32 654 in the preceding year. The capital expenditure during the year amounted to £159,632, the chief items being £123,550 for extensions of plant and £18,915 for mains and services. The sales of electrical energy increased from 43,770,345 to 50,667,433 kWh, and the maximum supply demanded rose from 25,506 to 28,003 kW. The average price per kWh obtained fell from 2.11d. to 1.94d.

HAMPSTEAD.—The accounts of the Borough Council's electricity undertaking (engineer, Mr. J. Leadbeater) for the year ended March 31st last, show a total revenue of £142,009, and working expenditure of £105,422, leaving a gross profit of £36,588. After deducting capital charges there was a net profit of £10,732. The previous year's working resulted in a net profit of £21,717. The capital expenditure during the year amounted to £31,093 the chief item being £12,700 for mains. The sales of electrical energy increased from 10,110,363 to 11,818,702 kWh, and the average price per kWh obtained fell from 3.35d. to 2.80d. The maximum supply demanded rose from 5,675 to 6,100 kW.

Manchester.—LOANS.—The Electricity Committee has recommended to the City Council that application be made for sanction to loans of £420,000 for mains, transformer stations, &c., and £25,000 for street lighting.

PROGRESS DURING PAST YEAR.—The sales manager's annual report for the year ended March 31st last shows that the total connections during the year amounted to 25,369 kW, and that 9,277 applications were received. The number of consumers increased by 3,526, and the number of hired electrical cookers connected by 401 to 678.

Morecambe.—ELECTRICITY EXTENSIONS.—The Electricity Committee has recommended the installation of another e.h.p. feeder from the Lancaster generating station, at a cost of £12,500, to supply electricity in the Heysham area.

Peterborough.—LOAN.—The Electricity Committee is applying for sanction to borrow £5,000 for the provision of services.

ELECTRICITY EXTENSIONS.—The electrical engineer and the city surveyor have been instructed to prepare plans for extensions at the generating station.

ELECTRICITY IN BULK.—The Electricity Committee is in communication with the Electricity Commissioners and Sir Charles Bright & Partners, Ltd., with regard to the proposal to give a bulk supply of electricity to the Spalding Urban District Council.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

SHIPLEY.—Lighting: 6¼d. per kWh. Domestic power: 2¼d. per kWh. Charges subject to a discount of 2½ per cent. for prompt payment of accounts.

SUTTON COLDFIELD.—Lighting; A reduction of ¼d. per kWh. Charges for heating, cooking, and power have also been reduced.

SALFORD.—Lighting: From 4¼d. to 4¼d. per kWh. Alternative annual charge rate for lighting: The kilowatt charge reduced by 10s. Heating: From 1¼d. to 1¼d. Power: Varying from 2¼d. to .9d, according to quantity consumed. Alternative annual charge for power: From £7 10s. per kW and .40d. per kWh (under 25 kW), to £7 per kWh and .375d. per kWh. Special reductions have also been made in contract rates for power. The charges have also been reduced in Prestwich urban district.

SWANSEA.—Lighting: From 6d. to 5¼d. per kWh. Maximum demand rate: Percentage increase from 40 to 20. Power: From 25 per cent. to 12½ per cent. above the pre-war rate. Heating and cooking: From 2d. to 1¼d. per kWh for the winter quarters.

Pwllheli.—ELECTRICITY AGREEMENT.—The Town Council has decided to sign an agreement with the Gwynedd Trust, Ltd., to supply the town with electricity at 6d. per kWh for public lighting and 9d. per kWh for domestic use. The company is prepared to proceed with the scheme at once, and the Council has agreed to withdraw all objections to an Order.

Southend-on-Sea.—INQUIRY.—An inquiry is to be held by the Electricity Commissioners on July 14th, to ascertain the manner in which the electricity supply has been administered.

LOANS.—The Town Council has applied for sanction to the following loans in connection with the electricity undertaking:—New plant and works £40,000; excess expenditure, £7,100 and £2,980; a.c. mains, converting plant, switchgear, and transformers, £25,000.

Special Orders.—Applications have been made to the Electricity Commissioners for Special Orders by the following authorities:—Wrexham Corporation, for the supply of electricity in parts of the rural district; the Derbyshire and Nottinghamshire Electric Power Co. in certain parishes in the rural district of Shardlow.

The Commissioners have submitted to the Minister of Transport for confirmation an Order made by them, for the supply of electricity by the Stanley Urban District Council in its area.

St. Austell (Cornwall).—ELECTRICITY SCHEME.—A scheme of electrical development is proposed by the St. Austell Electric Light & Power Co., Ltd. The object is the supply of electricity in the entire area in which the company has powers, embracing the towns of St. Austell and Fowey, St. Blazey, Par, part of St. Mewan, and in all 15 parishes, but as a first instalment it is intended to cater for half this area. On a site outside St. Blazey and close to the Par-Newquay railway line, a power station is to be erected with a capacity of 1,250 h.p. Work will be commenced upon it in a few weeks' time, the scheme having been sanctioned by the Electricity Commissioners. The rates to be charged in the new area will be 10d. per kWh for lighting and 6d. per kWh for power.

Stoke.—EXTENSION OF SUPPLY.—At a recent meeting of the Electricity Committtee the engineer reported that he had, with the borough electrical engineer of Newcastle-under-Lyme, interviewed the Electricity Commissioners regarding a supply being given in the western portion of the North-West Midlands electricity district and that the Commissioners would favourably regard any applications for the necessary powers to give supply to large and long-hour consumers therein. He further reported that the development of supply in the North-West Midlands district would probably involve extensions of the central power house.

PLANT EXTENSIONS.—The Electricity Committee has instructed the engineer to prepare a preliminary report upon extensions to the central power station to meet prospective demands which will have to be met in about three years.

ELECTRICITY AGREEMENT.—A communication has been received from the borough electrical engineer of Newcastle-under-Lyme with regard to the Madeley and Parkhouse collieries, and the engineer reported upon the terms which had been discussed by the Newcastle Electricity Committee, and these were approved. It was agreed that subject to an agreement being entered into for a supply of not less than an average of 2,000,000 kWh per annum for a period of seven years or more, with a maximum demand of not less than 100 kVA or more than 750 kVA, such a supply should be given and that the engineer should report as to the necessary mains.

Swansea.—LOAN.—The Town Council is applying for sanction to a loan of £33,137 for mains.

Walton-on-the-Naze.—ELECTRICITY SUPPLY.—There are now 463 houses and shops taking a supply of electricity, the total number of meters in use being 524. Street lighting extensions are being carried out by the Urban District Council.

West Ham.—YEAR'S WORKING.—The accounts of the Borough Council's electricity undertaking (engineer, Mr. F. W. Purse) for the year ended March 31st last, record a total revenue of £367,874, and working expenditure of £236,550, leaving a gross profit of £131,324, to which was added interest and other sundry items, making a total of £133,208. The previous year's figures were: Income, £335,885; working expenses, £229,172; gross profit, £106,713. Capital charges absorbed £94,356 and there was a net profit of £38,852 as compared with £21,577 in 1923-24. Of the profit, £15,940 was contributed to the borough fund, and the remainder transferred to reserve. The capital expenditure during the year, which included £16,462 for mains and £11,196 for transformers, &c., amounted to £31,996. The electrical energy sold increased from 50,612,888 kWh to 58,307,188 kWh, and the average price per kWh obtained fell from 1.58d. to 1.50d. The maximum supply demanded rose from 19,040 to 21,900 kW. The engineer's report states that during the year a contract was placed for a third 10,000-kW set, three water-tube boilers, and additions to the coal-handling plant, and it is anticipated that the new plant will be in commission before the coming winter. The interconnecting link between East Ham and Ilford was laid during the year, and a bulk supply to Ilford was commenced in December last.

Tramway and Railway Notes.

Australia.—TASMANIA.—*Launceston.*—The accounts of the City Council's tramway undertaking (superintendent, Mr. R. J. Strike) for the year ended June 30th, 1924, record a total income of £54,886, as compared with £53,097 in the preceding year. Working expenses totalled £37,181, as against £35,468, leaving a gross profit of £17,705 (£17,628). Interest absorbed £8,471, and £1,503 was contributed to sinking fund, leaving a net surplus of £7,731 (£7,553), which was transferred to reserve. The car-mileage increased from 466,361 to 472,701, and the number of passengers carried from 4,403,454 to 4,540,999.

Continental.—RUMANIA.—At the recent annual meeting of the Soci¿½ des Tramways et Eclairage Electriques de Braila, in Brussels, it was stated that negotiations were in progress with the municipal authorities of Braila regarding an extension of the concession. The existing power station having become unequal to the demands, a scheme for increasing the capacity of the plant is being considered, to finance which it is possible the concern will be converted from a Belgian to a Rumanian undertaking.

BULGARIA.—The first electric railway line to be built in Bulgaria was opened on June 28th. It links Sofia with its chief suburb, Kniajevo.

BELGIUM.—La Soci¿½ Nationale des Chemins de Fer Vicinaux is about to commence work on the electrification of the local railways between Antwerp and Wyneghem and between Antwerp and Wommelghem.

GERMANY.—At a recent meeting of the Baden Architects' and Engineers' Association, Herr Meyer stated that water power to the extent of 4,500 million kWh was available in Baden. The cost of electrifying the Mannheim-Basle section of the railway was estimated at £4,000,000, and £2,300,000 for the Mannheim-Heidelburg and Carlsruhe-Heidelberg sections. No date can be fixed for the commencement of the electrification work, as the matter of finance has yet to be settled.

(*Continued on page 63.*)

The Rugby Radio-Telegraph Station.

Some Notes on the Plant and Constructional Work.

THE accompanying illustrations of some of the plant that is being installed at the radio-telegraph and telephone station which the Government is building at Hillmorton, near Rugby, for communication with India, Australia, and South Africa, convey some idea of the magnitude of the constructional work involved. It is hoped to complete the station, which is being constructed by the Post Office Engineering Department, by the end of this year, and it has already been announced that the Western Electric Co., Ltd., is manufacturing the telephonic apparatus that is being installed, which will make transatlantic radio-telephony possible. Distant control from the Central Telegraph Office in London will be provided by direct land lines.

A general view of the exterior of the power house is shown in fig. 3. Three 500-kW motor-generator sets have been installed for furnishing the h.p. supply to the

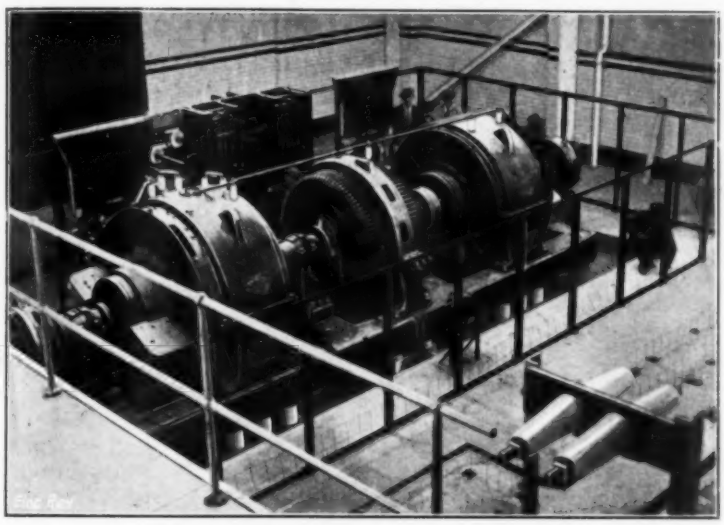


Fig. 1.—One of the 500-kW Motor Generators.

valves at from 12,000 to 18,000 V; the sets consist of 6,000-V d.c. generators connected in series and driven on insulators. Fig. 2 is a view of the main power switchboard, while fig. 4 shows one of three 640-kVA,

Fig. 3.—General View of the Power House.

12,000/2,200-V, 3-phase, 50-cycle Johnson & Phillips transformers. The station will use 54 metal-glass Western Electric valves, which will be connected in parallel and excited by an auxiliary oscillator. The filament supply will be provided by a 200-kVA, 416-V, 100-cycle synchronous motor alternator, and 700 tons of concrete have been used to build a ferro-concrete reservoir, which will contain the 500,000 gallons of water needed in connection with the cooling system of the transmitting valves.

What is claimed to be the world's largest bank of mica condensers is being supplied by the Dubilier Condenser Co. for installation at Rugby. They are constructed in such a manner that should a plate fail, it can be detected and replaced in a short time. Some of the contactor switchgear to be used in the station is being made by the General Electric Co., Ltd. Some 8,000 tons of concrete have been utilised for constructing the mast foundations and the

Fig. 2.—Main Power Switchboard.

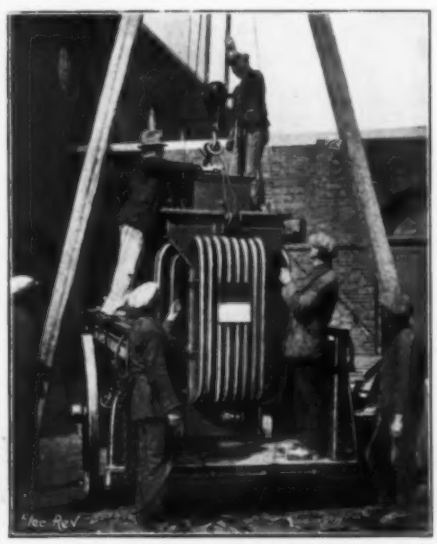


Fig. 4.—Unloading a Power Transformer.

by synchronous motors. The machine illustrated in fig. 1 is of the British Thomson-Houston Co.'s manufacture, and it will be noticed that its bedplate stands anchor blocks to which the stay ropes are attached. For making stays alone, 3,000 miles of wire have been used; the stay ropes were all made on site, for which purpose

special machinery was provided. The 150 wires, composing each of the largest stays, were drawn out, two by two, and then clamped together mechanically before being bound together with steel wire, the ends of the stays being bent over and fitted into tapered sockets, into which low-temperature melting metal was run so as to bind the ends of the wires.

Fig. 5.—Laying Earth Wires.

The 12 main lattice-steel masts have been nearly completed; they are 820 ft. high, and are supported on porcelain insulators and granite blocks as indicated in fig. 6, the maximum downward thrust of each mast being 400 tons. The aerial will take the form of wire "sausages," which will be supported by means of 12-ft. diameter steel spreaders, the whole being clamped to steel cables that pass down the centres of the masts. The aerial will be $2\frac{3}{4}$ miles in length. Each of the cables will have to withstand a tension strain of 6 tons on a calm day, the masts themselves being designed for a top horizontal pull of 10 tons, but during strong winds these figures will be considerably exceeded, and as a precautionary measure slipping devices have been fitted to the drums of the cable winches, one of which can be seen at the base of the mast in fig. 7. It is of interest to note that the top of a mast has been seen through a telescope to oscillate 3 ft. beyond a central position about its pivotal base. When designing them, however, allowance was made for a deflection of 8 ft., with a safety factor of from 3 to 6.

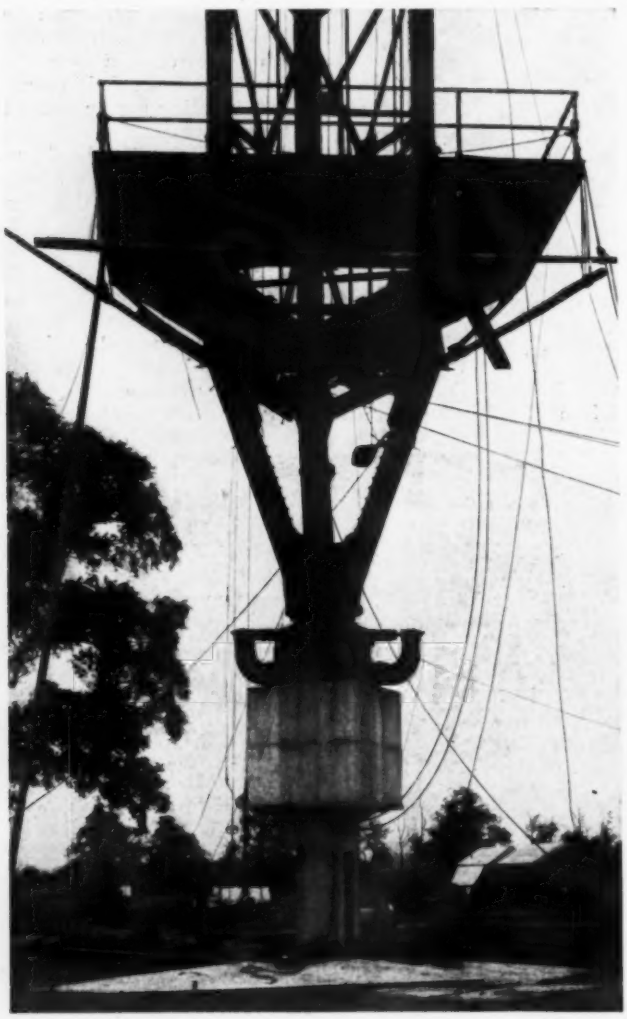


Fig. 6.—Pivoted Base of Mast.

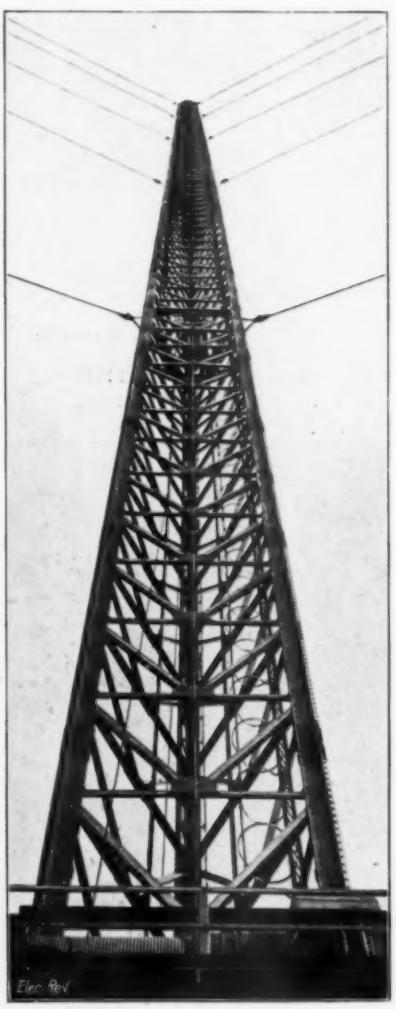


Fig. 7.—An 820-ft. Mast.

The "earth" system consists of about 80 miles of wire laid in the ground with the aid of a plough which was designed and built, with much of the other special plant

in use at Rugby, by the P.O. engineering staff. The plough, fig. 5, in a single operation, cuts a trench less than 1 in. in width, lays the wire, and partly fills in the trench again.

As no plant existed with which the porcelain mast insulators could be adequately tested electrically, a 100-kW steam-electric set was erected at Rugby for the purpose, the 500-volt d.c. being converted into high-frequency current by means of an electric arc and oscillating circuit. Up to April last 2,000 insulators had been tested at a pressure of 15,000 volts and a frequency of 50,000 cycles per second, no insulator being passed if an appreciable rise of temperature was recorded after a period of one hour.

It is noteworthy that the application of this voltage and frequency to defective insulators has occasioned, in some cases, a sufficient rise in temperature to melt the porcelain. It was the failure in this way of some of the Leafield insulators that caused the P.O. Engineering Department to inquire into the behaviour of various insulating materials.

Fig. 10.—Switchboard and some Condensers.

Fig. 8.—Testing Aerial Insulators at Rugby.

In connection with the manufacture of large inductance coils, investigation has revealed American white-wood (Canary) to be the most suitable material (being quite cool at the end of the test), the next best in order being teak, yellow deal, and satin walnut, all of which are superior to two well-known proprietary synthetic resin and cellulose materials which are generally regarded as suitable for high-frequency work.

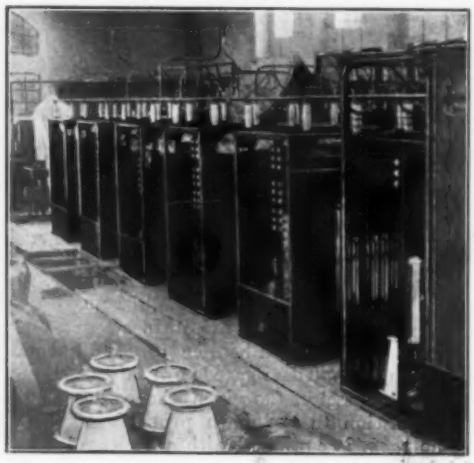


Fig. 11.—Some of the Valve Panels.

Fig. 9.—Aerial "Lead-in."

Fig. 12.—Earth "Lead-in."

In conclusion, we have to express our indebtedness to the *Post Office Electrical Engineers' Journal* for permission to reproduce figs. 5 and 6, and for some of the details set out above.

Electricity on a 100-ton Motor Yacht.

The Electrically-Equipped Yacht "Mahceeb."

SUCCESSFUL trials have recently been completed of the 100-ton yacht *Mahceeb*, constructed at Hampton-on-Thames by Messrs. Thornycroft for Mr. Henry Beecham, under the supervision of Messrs. Wells & Kemp, naval architects. The vessel is of the schooner type, having fore and aft rig. It carries two pole masts fitted with foresail, fore staysail and main sails; it is 92 ft. long, the beam being 16 ft. 6 in., and the draught 6 ft. The hull has been constructed to Lloyd's special survey, class

Fig. 1.—The Motor Yacht "Mahceeb.

16, A1, and is built of double skin teak on English oak frames, the decks and covering boards being also of teak.

Equipped with two Thornycroft engines, fitted with reducing and reversing gears, and having a total output of 15 b.h.p., the yacht will attain a speed of nearly 11 knots when running on both engines, and about 8¾ knots on one engine. These speeds are said to be remarkably good for a vessel of the given dimensions.

In addition to the main propelling machinery, the engine room is equipped with a Thornycroft M/2 type, 15-b.h.p. generating set, arranged at the forward end. This supplies electrical energy to the capstan, and also for cooking, heating, and lighting purposes throughout the boat. Fuel and oil tanks are arranged at the after end of this compartment, while on the port side are to be found the tool rack and work bench, and space has been provided for water pumps.

The accommodation has been laid out to embody the fullest degree of comfort possible on the dimensions. The headroom throughout is ample; that in the guests' quarters is 7 ft., and in the deckhouse over 6 ft. The owner's cabin, situated just aft of midship, extends the breadth of the yacht. The decoration of this compartment is very attractive, and consists of Indian grey wood framing and panelling, all French polished, the roof being in flatted white. All the furniture is of grey wood, and includes a large double bed, full-height wardrobes on each side, dressing table, settee, and writing desk. A bathroom of good size is arranged on the port side adjoining the owner's cabin, and is reached from the passage running aft. Separate taps provide for hot and cold water and also salt water to both bath and wash basin, a No. 4 Bastian storage electric geyser, ship's pattern, providing the hot water for the bath and the cabins. The guests' staterooms are arranged aft, two being on the port side and one on the starboard. The decoration and furnishing of these rooms are similar to those in the owner's cabin, but in mahogany; a wardrobe is provided in each, and lockers are also arranged underneath the berths. A wash basin with hot and cold water taps is also fitted in each room.

A servants' cabin is situated in proximity to these state rooms, and is fitted up with two berths, the top one being made to hinge up. As in the other compartments, a wardrobe and wash basin are provided. Access to the baggage room and linen cupboard aft is arranged from the servants' cabin. The crew space forward is of good size and fitted with four folding cots, also the usual furniture and fittings. The captain's and engineers' quarters adjoin, and in these are provided two sofa berths and one folding berth with drawers underneath, a hinged table, cupboards and cushioned seat. A large and well-equipped galley and pantry occupy the space between these quarters and the engine room, and is fitted with every electrical convenience. One sectional hob and two ovens are installed for cooking. The hob is fitted with Bastian "Quartzalite" heating elements, which, it is claimed, are immune from damage if milk, &c., is spilt over them, an important consideration aboard ship. The elements are easily removable for cleaning, &c. The ovens are of the light sheet-iron type, and the doors are arranged with glass panels to enable the chef to see the progress inside without opening the doors. The two ovens are built on the multiple unit system, so that additions can be easily arranged. A No. 3 size storage geyser is also fitted in the pantry for general use. As it is intended that meals should be taken in the deck saloon, a lift is provided between this and the pantry directly underneath; a staircase gives direct access to the pantry from the deck. A view of the interior of the pantry, showing the cooking apparatus, &c., is shown in fig. 2.

Fig. 2.—A Corner of the Electrically-equipped Pantry.

Electric fires, fitted with "Quartzalite" elements, are provided in the various compartments. These are of the Adam 1,000- and 500-W patterns, finished to match the decorative schemes.

A view of the *Mahceeb* afloat is shown in fig. 1.

Tramway and Railway Notes.

(*Continued from page 58.*)

Chesterfield.—RAILLESS CARS.—An exhaustive report on the tramway system has been prepared by Mr. G. H. Margrave, the former manager, in which he estimates that the natural life of the present tramway will be reached about two years hence, and recommends the adoption of a railless-car system. He states that the new capital needed for railless traction would be £39,954, with £10,269 additional for interest and sinking fund. To modernise the present system would cost £64,308 capital and £11,423 interest, &c., while petrol 'bus capital would total £35,400, with £12,132 interest. Mr. Margrave estimates a profit of £2,100 on railless cars, a loss of £4,691 on tramways, and a loss of £3,720 on petrol 'buses.

Croydon.—YEAR'S WORKING.—The report on the Corporation tramway undertaking (manager, Mr. T. B. Goodyer) for the year ended March 31st last shows a total revenue of £112,685, as compared with £112,021 in the preceding year. Working expenses amounted to £141,537, and recoverable expenditure charged to revenue £3,796, making a total of £145,333, as against £121,734, leaving a gross deficit of £32,649 (£9,713). Capital charges absorbed £26,188, and there was a net loss of £58,837, as compared with a deficit of £25,543 in 1923-24. The number of car miles run increased from 2,240,584 to 2,570,542, but the number of passengers carried fell from 19,946,512 to 19,552,621.

Ipswich.—YEAR'S WORKING.—The accounts of the Corporation tramway undertaking (manager, Mr. A. S. Black) for the year ended March 31st last record a total revenue of £41,776 (railless-cars, £4,084), as compared with £42,348 in 1923-24. Working expenses amounted to £35,328 (railless-cars, £3,245), as against £35,254, leaving a gross profit of £6,447 (£7,094). After deducting capital charges, there was a net surplus of £2,937. The number of car-miles run increased from 587,348 to 582,729 (railless cars, 38,565 and 61,698 respectively), and the number of passengers carried from 5,719,168 to 5,922,474.

Kirkcaldy.—YEAR'S WORKING.—The report on the working of the Corporation tramway undertaking for the year ended May 15th last shows a total revenue of £35,167, and working expenditure of £24,595, leaving a gross profit of £10,572. The figures for the previous year were—revenue, £35,372; working expenses, £24,757; gross profit, £10,615. Capital charges absorbed £6,456, and there was a net profit of £4,116, as compared with £3,838 in 1923-24. The number of car-miles run fell from 429,425 to 426,790, but the number of passengers carried increased from 5,205,865 to 5,543,456.

London.—REOPENING OF KENNINGTON STATION.—The Tube station at Kennington was re-opened for traffic on Monday, July 6th. This station was closed in November, 1923, and has since acted as a base for the engineering operations in connection with the enlarging of the City & South London Railway tunnels and latterly with the new Underground extension from Kennington to Charing Cross. Considerable progress has been made with the elaborate junctions and tunnel work at Kennington, and when this work is completed, trains from the Hampstead or City lines will be able to continue southwards to Clapham and Morden. At the present rate of progress the "Kennington Loop" will be opened for traffic early in 1926, as also will the new extension from Clapham to Morden.

Middlesbrough.—INQUIRY.—A Ministry of Transport inquiry was held on June 25th relative to the Corporation's proposal to widen Newport Road. The estimated cost was stated to be £17,231, of which £15,000 would be expended on a new tramway track.

Sheffield-Rotherham.—RAILWAY ELECTRIFICATION.—In an exhaustive report on road and rail communications to the Rotherham Regional Planning Committee, Mr. W. R. Davidge, a member of the Town Planning Institute has recommended a regular 10-minute railway service between Sheffield and Rotherham, and the electrification of the line.

Telegraph and Telephone Notes.

Azores.—GERMAN CABLE STATION.—An agreement has been concluded between the German and Portuguese Governments whereby the buildings in Horta, Fayal, which belonged to the German Atlantic submarine telegraph cable station, and were taken from it at the outbreak of war, are now to be given back to the company. The German Government, in return, has renounced all right to the German Church in Lisbon, and the German Government and Cable Company also undertake to forgo all claims in the matter against the Portuguese State. The agreement in no way affects the reparations owed by Germany to Portugal.—*Reuter* (Lisbon).

Belgian Congo.—NEW TELEPHONE LINE.—The Compagnie des Chemins de Fer du Congo Superieur au Grands Lacs Africains is erecting a new 430-mile telephone line along its railway system.

Canada.—NEW RADIO STATIONS.—Arrangements are being made by the north-west territories branch of the Department of the Interior to erect three radio stations in the far north. They, it is thought, will help materially the work of the police, navigators, and traders who are cut off from civilisation for so many months in the year. Edmonton, Alberta, will be the southern terminus of the system.—*Reuter* (Ottawa).

Electrophone Service.—As already announced, the electrophone service, which commenced 35 years ago, is being discontinued on account of insufficient use having been made of it since the establishment of radio broadcasting. There were 644 subscribers to the service on June 1st, and it is understood that Lord Wolmer, Assistant Postmaster-General, is willing to discuss the possibilities of granting a licence to a company wishful to provide such a service.

Persia.—THE TELEPHONE SYSTEM.—In 1903 a concession was granted to a group of Persians for 60 years, its terms exempting telephone buildings from all Government taxes, and all equipment consigned to the company from customs duties. The Societe Generale des Telephones de Perse, with headquarters at Teheran, is the present holder of the concession; the owners of two-thirds of the shares of stock must be Persian subjects. The 24 telephone magneto exchanges serve a total of 2,639 subscribers; the subscribers must furnish their own instruments, which are mostly of Swedish manufacture, but there are also Russian and German makes in service. A few American and English instruments are on sale, but are not in general demand. Besides the exchanges belonging to or licensed by the telephone monopoly, there are exchanges in Gilan Province, Resht, Isfahan, and a number of private exchanges bordering the Persian Gulf. The latter are, as a rule, operated by the British military authorities. The central office equipment in Teheran is of Russian manufacture and has been in service about 20 years. There are five branch exchanges and at present 1,350 subscribers, the average number of calls being 414 per day. General reconstruction of the plant is now under way, says *Commerce Reports*, and all of the equipment has been purchased in Germany. Bare iron wire on poles is being replaced in part by underground cables, and hereafter subscribers will not be required to furnish their own instruments. Eleven other exchanges average 66 subscribers each.

Spain.—TELEGRAPH IMPROVEMENTS.—A Government appropriation is announced for the improvement of Spanish telegraph lines and for relaying the cable between Spain and the Canary Islands.

Sweden.—NEW RADIO STATION.—Sweden's largest telegraph establishment, the Trans-Atlantic radio station at Grimeton, near Varber, was opened by the King on July 2nd. After the inauguration, the King addressed a long telegram to President Coolidge, who answered in cordial terms.—*Reuter* (Stockholm).

Radio Notes.

East Africa.—PROPOSED STATION.—Colonel Norman Harrison a director of the Western Electric Co., who has just concluded an investigation into the possibilities of wireless in Kenya and Uganda, advocates the erection of a broadcasting station at Nairobi, with a daylight range of 400 miles, serving the whole of East Africa, says *The Times* Nairobi correspondent. He considers that such a station, coupled with a public address system, would prove invaluable to the Education, Medical, and other Departments. The cost of the proposed station would be at least £10,000.

European Broadcasting Conference.—GENEVA MEETING.—At the invitation of the International Broadcasting Office, representatives of some seventy European broadcasting stations agreed to take part in the technical conference which met at Geneva on July 6th. It is hoped that this conference may discover a solution of the difficult problem of wave lengths. By courtesy of the Secretary-General of the League of Nations, the conference was held in the Palais des Nations.—*Reuter* (Geneva).

Radio on Aircraft.—DELIBERATE INTERFERENCE.—One of the most interesting features of the recent Royal Air Force Display at Hendon was the demonstration of radio-telephone equipment for formation control. This is the first time that such an exhibition has been given to the public. Compactness of apparatus is of vital importance; the Marconi A.D.5 set requires no trailing aerial, the whole of the aerial system being permanently attached to, and insulated from, the wings and fuselage of the aeroplane. The latter's power of manœuvring is thus in no way impaired and a high degree of radiation is maintained by the use of short wavelengths, which have the advantage of freedom of interference from, and with other aircraft and ground sets. The transmitter and receiver are mounted as separate units and remote control enables the apparatus to be mounted in any odd corner of the machine without interfering with the ability of the pilot to operate and adjust it when flying. The disappointing results, both to the spectators on the ground and to listeners generally, of the recent squadron drill at Hendon have been investigated by a joint conference of technical experts of the Royal Air Force and the B.B.C. It has been established that the organisation was complete and that no breakdown of apparatus occurred. There is no doubt that the trouble was due to an extremely powerful heterodyne, and the evidence suggests that this interference was deliberate, although it cannot at present be traced. The incident is the more regrettable as the Royal Air Force had announced the wave-length beforehand, and made a special appeal to the public to refrain from interfering on it.

Contracts Open and Closed.

(The date given in parentheses at the end of the paragraph indicates the issue of the "Electrical Review" in which the "Official Notice" appeared in our advertisement pages.)

Open.

Australia.—SYDNEY.—July 27th. Municipal Council. One 5,000-kVA, 5,000/33,000-V step-up transformer; supply of gas-filled lamps. Specifications from the office of the Construction Engineer, Electricity Department, Town Hall, Sydney.

Postmaster-General's Department.—Automatic c.b. telephone exchange equipment, Canberra exchange.

New South Wales Public Works Department. September 14th. Electrical equipment, machinery, &c., for bascule bridge over Cooks River at General Holmes' Drive.

September 21st. Material and apparatus for complete communication system, Barrenjack hydro-electric scheme.—*Tenders.*

MELBOURNE.—August 3rd. Electricity Commission of Victoria. Switchgear and accessories.

September 14th. 3,000-kVA transformers and spares. Particulars from the Purchasing Section of the Commission, William Street, Melbourne.

Postmaster-General's Department. August 11th. (Sched. C. 26), plugs and sleeves (switchboard). (Sched. C. 25), switchboard cords.

September 15th. Lamps lamp caps, and lamp sockets. Tender forms from High Commissioner, London.

Barking.—July 28th. Electricity and Tramways Department. One 1,000-kW and one 500-kW rotary converters, with oil-cooled transformers and synchronising panels or, alternatively, one 1,000-kW and one 500-kW motor-converters (La Cour type), with starting and synchronising panels, e.h.p. switchboard, 3-wire d.c. switchboard and traction board. (See this issue.)

Belgium.—July 22nd. Belgian Post and Telegraph authorities at La Salle Madeleine, Brussels. Supply and laying at Liége of a quantity of telephone cable, with accessories. Particulars (Cahier des Charges Special No. 3-124) for 5 fr. 30 c.

Bridgend.—July 31st. Penybont Rural District Council. Kenfig Hill electricity scheme. L.p. underground and overhead mains, transformers, switchgear, meters, and house wiring. (June 26th.)

Cardiff.—Education Committee. Electrical wiring and fittings for Council schools at Ely and Mynachdy. Specifications from the City Electrical Engineer, The Hayes, Cardiff.

Dundee.—July 17th. Electricity Department. Steam and exhaust pipes. (June 26th.)

Eccles.—July 15th. Electricity Department. 2,200-V switchboard, consisting of five feeder panels. Specification and form of tender from Borough Electrical Engineer, Electricity Works, Cawdor Street, Patricroft.

Edinburgh.—July 13th. Electricity Department. Installation of electric lighting at the public wash-house, Abbeymount, Edinburgh. Specifications from Engineer, Dewar Place.

Egypt.—CAIRO.—Inspecting Engineer in London. 3,000 metres submarine cable, underground cables, 10 tons line wire, bolts and nuts, &c.

Grimsby.—August 1st. Electricity Department. Storage battery, booster, and switchgear. (See this issue.)

Hanwell.—July 18th. Central London School District. Extension of the electric lighting installation. Specification from Mr. G. F. Morrell, clerk to the Managers, Greenford Avenue, Hanwell, W.7.

India.—SIMLA.—July 20th. Indian Stores Department. Diesel-engine alternator sets, water-cooling units, oil fuel storage tank, oil-purifier equipment, 10-ton overhead crane, switchboard, cables, transformers, e.h.p. feeder cables, &c.*

July 17th. India Store Department. Porcelain insulators. (See this issue.)

Leeds.—July 15th. Corporation. Electric lighting installation at 40, Park Lane. Particulars from Mr. W. T. Lancashire city engineer, Municipal Buildings.

July 14th. Board of Guardians. Supply of "Osram" electric lamps. Specifications from Mr. J. H. Ford, clerk to Board of Guardians, Poor Law Offices, 11, South Parade.

London.—ST. PANCRAS.—September 3rd. Electricity Department. One 10,000-kW steam turbine, alternator, condensing plant, pipes, &c. (See this issue.)

BETHNAL GREEN.—July 20th. Electricity Department. L.p. cables and switchgear. (See this issue.)

Lymm.—July 13th. Urban District Council. Electrically-driven centrifugal pump. Particulars from Mr. N. Holt, clerk to the Council, Council Offices.

Manchester.—July 16th. Board of Guardians. Electrically-driven booster pumping plant at Booth Hall Infirmary. Particulars from Mr. E. Hargreaves, Union Offices.

July 20th. Electricity Department. Electric cooking ranges, and switches and cut-outs for 12 months. (July 3rd.)

July 14th. Tramways Committee. Span wire brackets for tramway poles; copper trolley wire; copper bonds. Specifications from Mr. H. Mattinson, general manager and chief engineer, Corporation Tramways, 55, Piccadilly, Manchester.

New Zealand.—WELLINGTON.—August 18th. Posts and Telegraph Department. Switchboard plugs.*

INVERCARGILL.—Electricity Department. 2 200 ft. .1 sq. in. 11,000-V cable; 80 ft. .3 sq. in. 3,300-V cable and spares.*

August 17th. Four 667-kVA single-phase transformers.*

MARLBOROUGH.—September 22nd Electric Power Board. Turbines, generators, and switchgear. (B.X. 1,904.)*

South Africa.—JOHANNESBURG.—August 1st. Municipal Council. Twelve a.c. power relays.*

West Ham.—July 20th. Education Committee. Wiring of eight schools. (June 26th.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Closed.

Australia.—SYDNEY.—City Council. Accepted:—

Double-braided weatherproof cable (£4,554).—Enfield Cable Works (Aust.), Ltd.

Service boards (£999).—G. Hudson & Sons, Ltd.

10,000-V feeder protective apparatus (£587 and £113).—Australian General Electric Co., Ltd.

5,000-V potential transformers.—Australian General Electric Co., Ltd.

A.c. consumers' meters (£15,287).—Electricity Meter Mfg. Co.

MELBOURNE.—Department of Works and Railways.

7 motors at City South Telephone Exchange, Sydney (£728).—Siemens Bros. & Co., Ltd. —*TENDERS.*

Belgium.—Belgian, Swiss, and British (Metropolitan-Vickers, Ltd.) firms submitted tenders last week to the municipal authorities of Schaerbeek, Brussels, for the supply of 112 h.p. and l.p. electricity meters. The lowest offer was that of the New Antwerp Telephone and Electrical Works Co.

Birkenhead.—Tramways Committee. Accepted:—

Electrical equipment at tramways depôt (£2,961).—British Thomson-Houston Co., Ltd.

Birmingham.—Education Committee. Accepted:—

Electric lighting installation at Billesley elementary school (£435).—R. H. Newton.

Corporation. Accepted:—

Three double-deck railless cars.—Railless, Ltd.

Burton-on-Trent.—Electricity Committee. Accepted:—

Mains (£2,885).—Johnson & Phillips, Ltd.

Switchgear (£481); switchgear and transformers (£1,605).—Ferguson, Pailin, Ltd.

Canterbury.—Town Council. Accepted—

2,300 yd. of cable (£1,897).—Western Electric Co., Ltd.

Dundee.—Corporation. Accepted:—

Electric lighting installation at 216 houses at Dudhope (£1,696).—R. Kilpatrick & Co.

Hawarden.—Rural Council. Accepted:—

Five sub-station transformers (£499).—General Electric Co., Ltd.

Switchgear (£972).—Powell Lighting Supplies Co., Ltd.

Hull.—Electricity Committee. Accepted:—

Two 7,000-kW turbo-alternators:—

	Steam Consumption. (lb. per kW hr.).	Price.
Oerlikon, Ltd.	11.20	£43,042
Escher Wyss & Co.	10.72	53,176
English Electric Co., Ltd.	11.06	56,812
James Howden & Co., Ltd.	11.00	57,640
Ditto	11.00	57,681
C. A. Parsons & Co., Ltd.	11.00	57,720*
Brush Electrical Engineering Co., Ltd. (Accepted.)	10.67	**57,823**
British Thomson-Houston Co., Ltd.	11.10	57,988
Ditto	11.10	58,319
Ditto	11.10	58,834
Fraser & Chalmers	10.80	59,251
British Thomson-Houston Co., Ltd.	11.10	59,304
Metropolitan-Vickers Electrical Co., Ltd. ...	10.66	61,430
C. A. Parsons & Co., Ltd.	10.42	62,280*
Richardsons, Westgarth & Co., Ltd.	11.27	76,036

*7,500 kW.

Telephones Committee. Switchboards:—

British L. M. Ericsson Manufacturing Co., Ltd. (Accepted.)		**£398**
Western Electric Co., Ltd.		323
Peel-Conner Telephone Works, Ltd.		299

Lamp Contracts.—The Royal Mail Steam Packet Co. has placed a contract for a 12 months' supply of gasfilled lamps and an order for a large number of metal-filament and carbon-filament lamps with the Siemens & English Electric Lamp Co., Ltd.

The Edison Swan Electric Co., Ltd., has received an order from the Great Southern Railway of Ireland for six months' supply of electric lamps.

Leeds.—Tramways Committee. Accepted:—

50 gear wheels (£444).—National Steel Foundry (1914), Ltd.

150 pinions (£139).—W. Muir & Co., Ltd.

Electricity Committee. Accepted:—

Cables.—W. T. Henley's Telegraph Works Co., Ltd. (£7,485); Enfield Cable Works, Ltd. (£3,499); Macintosh Cable Co., Ltd. (£2,664).

Meters (£3,900).—Measurement, Ltd.

Libraries Committee. Accepted:—

Electric lighting installation, Alexander Street premises (£184).—Cloke's Extension, Ltd.

London.—ST. PANCRAS.—Electricity Committee. Recommended :—

Coal for the electricity station for eight months from August 1st :—

15,400 tons Bentinck Derby main slack, ¾ to 1 in. (22s. 5d. per ton); 7,200 tons Stanton Deep nutty slack (21s. 11d. per ton).—J. H. Beattie and Co., Ltd.

GREAT WESTERN RAILWAY CO.

Six petrol-electric mobile cranes.—Ransomes & Rapier, Ltd.

Manchester.—The City Council at its meeting last week, by 77 votes to 17, rejected the recommendation of the Tramways Committee to place a £5,000 contract for tramway track work with the United States Steel Products Co. The *Manchester Guardian* states that at one time during the discussion there seemed to be a possibility of the old fiscal controversy being reintroduced but eventually the Council took the view that the tender should not be accepted, mainly because of the unemployment in this country, and because evidence was produced to the effect that the conditions of employment in the American firm did not conform with the provisions of the Fair Contracts Clause of the Standing Orders of the Manchester Corporation. By an overwhelming majority the Tramways Committee was instructed to accept the lowest English tender for this particular work.

Oldham.—Electricity Committee. Accepted:—

Transformers.—Ferranti, Ltd.

Rotherham.—Electricity Committee. Accepted:—

250-kW transformer (£217).—General Electric Co., Ltd.

Sheffield.—Tramways Committee. Accepted:—

750 tons of tramway rails (£8,250).—Steel, Peech & Tozer, Ltd.
Copper bonds (£92).—British Insulated & Helsby Cables, Ltd.
Three 500-kVA transformers (£1,283).—British Electric Transformer Co., Ltd.
Ropeway extension at Neepsend power station (£2,145).—R. White & Sons, Ltd.

Sleaford.—Urban Council. Accepted:—

Additions to station (£849).—Banks & Son.
Switchboard (£107).—Edison Swan Electric Co., Ltd.
Oil engine (£4,960).—Premier Gas Engine Co., Ltd.
Generator (£1,450).—General Electric Co., Ltd.

South Africa.—JOHANNESBURG.—Department of Posts and Telegraphs. Accepted :—

Apparatus for automatic telephone exchange, Kloof, Natal (£1,532).—Siemens Bros & Co., Ltd.

DURBAN.—Municipal Council.

5 miles .25 sq. in., 6,600-V cable (£7,539); 1¼ miles .1-in. ditto (£1,065); 1 ton bare copper wire (£90).—T. Barlow & Sons, Ltd.
10 " Falco " electric stoves and 1 bath heater, for the fire station (married quarters) (£204).—J. F. Chapman.
One 250-kVA, 3-phase transformer (£185).—Ferranti, Ltd.
1¼ miles .06 sq. in. 6,600-V cable (£1,000).—R. D. Lavery & Co., Ltd.
Watt-hour meters.—Metropolitan-Vickers Electrical Co., Ltd. (£611); Vincent & Pullar, Ltd. (£392).
Two 250-kVA single-phase transformers (£414).—Vincent & Pullar, Ltd.
One telpher hoist for ash removal at power station (£785).—R. Dempster and Son, Ltd.—*South African Power Engineer.*

Notes.

Traffic Control Device.—Experiments are being made in Berlin at night with electrically-lighted street "islands," which will afford policemen on point duty a safe stand. The light is thrown upwards from the ground on to the traffic controllers so that their signals can be seen clearly from a distance, says the *Daily Mail*. In winter the "islands" will be heated.

Electrical Exhibits at the Royal Agricultural Show.—About 50 of the stands at the Royal Agricultural Show of England, which is being held at Chester this week (July 7th to 11th), are electrically equipped, energy being supplied free of charge by the Chester Corporation, to which must be given credit for having persuaded the R.A.S.E. to agree to the wiring of stands. One and a half miles of overhead transmission is employed. The Electricity Department of the Corporation has a stand where demonstrations are being given, showing the utility of electricity in the homestead and on the farm, in numerous directions. Mr. S. E. Britton, M.I.E.E., M.I.Mech.E., city electrical engineer, informed our representative that his department was "all out" to dissipate some of the prejudiced and ill-informed ideas concerning the use of electricity in agriculture. The purposes for which electric power is used on various stands at the Royal Show are :—Refrigerating, milking and milk cooling, corn grinding and milling, conveyors, ploughing, mole draining, cultivators, winnowing, barley dressing, seed cleaning, churning and separators, thrashing machinery, water pumping, pasteurising, barn machinery, bottle washing, bacon slicing, oil refining, heating and driving linotype machinery, crop drying, lighting, heating, fans, and for general purposes. On Wednesday morning (July 8th) there was to be an Electro-Farming Conference, at which Lord Bledisloe, K.B.E., was to preside, and Sir E. John Russell, D.Sc., F.R.S., was to deliver a speech from the point of view of the agriculturist. Mr. S. E. Britton and Mr. R. Borlase Matthews were also down to speak on the practical applications of electricity to agriculture.

Fire.—On July 6th, the premises of the Brighton Supply Stores, Gloucester Road, Brighton, were badly damaged by fire and water. The shop was stocked with electrical and radio accessories.

Appointments Vacant.—Fitter-Driver (67s. 3d.), for Severalls Mental Hospital, Colchester. Lady Demonstrator (£182) for the Borough of Cheltenham electricity department. Charge Engineer for the St. Helens Corporation electricity department. Charge Engineer for the Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board. Meter Tester and Repairer for the Eastbourne Corporation Electricity Department. Junior Draughtsman for the Cardiff Corporation Electricity Department. Junior Electrical Testing Assistant for Salford Borough Council Electricity Department.

Transformer Oil Problems.—The American National Electric Light Association's 1925 Electrical Apparatus Committee has reported that some difficulties have been experienced through the congealing of oil in transformers that have been subjected to extremely low temperatures, and a few examples are cited in *Power*. Freezing in the pipe connection between the transformer and the conservator tank has occurred in several cases, and a remedy has been found in covering the pipes with a heavy lagging of heat insulating material which in some cases has been supplemented with a small electric heater. In one case the temperature of the transformer was noticed to rise, due apparently to the oil congealing and impeding the circulation through the radiators; after applying external heat for a short time to the lower end of the radiators, free circulation was established and the transformer temperature reduced. A case of the sludging of transformer oil is also reported; investigations indicated that the deterioration of oil varied considerably with transformers of different make, but the possible causes have not yet been determined. The causes of the deterioration of oil for use in transformers and oil circuit breakers are engaging the serious attention of several manufacturers of equipment for filtering and cleaning oil. In addition to the well-known methods, using blotter filters and centrifugal separators, other methods, involving supplementary treatment, are being tried in which certain reagents are introduced into the oil to absorb impurities, and separated out again, leaving a clean oil.

Coosa River Hydro Project. — According to *Power*, the Alabama Power Co. has filed an application with the Federal Power Commission for licence to build a hydro-electric power dam on the Coosa River 15 miles above Montgomery, Ala. It proposes to complete the scheme within three years, commencing in December next. The dam is to be 90 ft. high with an initial installation of 72,000 h.p., estimated to cost $13,500,000. It will complete about 65 miles of navigation pool created by the power dams of this company on the 116-mile non-navigable stretch of the Coosa River between Gadsden and Montgomery. The pools submerge several small low locks and dams built by the Government more than a third of a century ago to improve navigation, but which have long since been abandoned.

A Substitute for the Liquid-air Trap for Mercury Vapour.—In an interesting letter published in *Nature* of June 27th, Messrs. A. Ll. Hughes and F. E. Poindexter, of Washington University, U.S.A., refer to the disadvantages of the liquid-air trap for mercury vapour in the mercury vapour condensation pump, and state that in the course of a search for an alternative method of trapping mercury vapour, they have found that the alkali metals have an extraordinary power of absorbing mercury vapour. Their practice is to put a small piece of sodium or potassium into a trap between the diffusion pump and the apparatus to be exhausted, and to distil it, after the vacuum has been obtained, on to the sides of the trap, thus lining it with the metal for a few centimetres. Using an ionisation gauge for the vessel to be exhausted, they have found that the pressure of mercury vapour in it with a potassium-lined trap between it and the pump is certainly less than 5×10^{-9} mm. By making direct comparisons between the trapping power of a potassium-lined tube and that of the usual liquid-air trap, the same ionisation gauge measuring the pressure reduction, they have found that the potassium-lined trap is quite as satisfactory as liquid air. The residual pressures obtained in various tests seemed to depend entirely upon the vigour with which the ionisation gauge and connecting tubes were outgassed by heat treatment before the measurements were made, and not at all upon whether liquid air or metallic potassium was used to trap the mercury. In one test, in which sodium was the active metal, the pressure in the ionisation gauge beyond the trap after 25 days was within 50 per cent. of its initial value (2×10^{-7} mm.).

In a second test, they used the first appearance of mercury lines in the spectrum of helium, at less than 0.01 mm. pressure, as a criterion of the diminution of the trapping power of a potassium-lined trap for mercury vapour. The mercury lines did not appear until the eleventh week, in which time the potassium had absorbed a little more than 150 per cent. of its own weight of mercury.

Report on a Nottingham Breakdown.—A recent dislocation of the Nottingham electricity supply, involving an entire stoppage throughout one day of the tramways and the partial holding up of the supply for illuminating and general motive purposes, formed the subject of reference at a meeting of the City Council on July 6th, when Alderman E. Huntsman, chairman of the Electricity Committee, explained that investigations as to the firing of the cables at the St. Ann's Well Road generating station, which was the cause of the mischief showed that the outbreak did not originate through electrical